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Seri Ethnozoology

by BORYS MALKIN

[Title Page]

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OCCASIONAL PAPERS OF THE MUSEUM IDAHO STATE COLLEGE

Editors — Earl H. Swanson, Jr., B. Robert Butler

Seri Ethnozoology

by

Borys Malkin

NUMBER 7

Editorial Comment

121 This paper was originally written by Borys Malkin as a thesis in
partial fulfillment of the requirements of the degree for Master of Arts in
Anthropology at the University of Minnesota, 1960. It has since been
128 edited to verify scientific names and to drop some of the original introduc-
tory portions of the manuscript. Unfortunately, because of technical prob-
lems involved in reproducing them, the Seri names also had to be dropped.

At the time the manuscript went to press, the author was in South America conducting field work. It was not feasible to send various stages of proof to him for his personal attention, and the editors were not always certain of the appropriate decision.

ott *Seri Ethnozoology* represents an extension of the Idaho State College Museum's previous publishing policy in anthropology. However, its content and its quality are important and fall within our intent to publish items of wide as well as of regional scholarly interest.

E.H.S., B.R.B.

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I

INTRODUCTION

131 [121] [361] [321] [464] The territory discussed in this paper is somewhat larger than the historical area occupied by the Seris. While Seri settlements are limited today to a quite narrow range, the Tiburon Island and the coast of Sonora immediately adjacent to it, they are familiar with a far larger region, owing to their periodic trips, either on their own after fish, turtle and game or, occasionally, in the temporary employ of the Mexican fish-traders and even farmers. The further away from Tiburon perimeter, the lesser their familiarity with a locality.

The area is limited by Hermosillo in the east, Punta Penasco and Porto Libertad in the north, and Nogales in the south, and finally it includes also the coast of Baja California which the Seris sometimes visit. It also includes all of the islands within that area, Tiburon, Patos, Rasa, Angel de la Guarda, San Lorenzo and San Esteban.

137 With very minor variations this entire region
belongs properly to the Sonoran desert. *Palo
Verde*, *Palo Fierro*, *Pithaya*, *Mesquite*, *Cholla*,
Sahuaro, prickly pear, elephant tree and creosote
bush are the basic plants. Among the vertebrates,
136 such forms as the Sonoran bighorn, deer, cougar,
jumping rat, badger, coyote, skunk, rattlesnake,
sidewinder and Gila Monster are most conspicuous and diagnostic. Among the birds are the roadrunner, the raven, as well as many pelagic or littoral birds, the pelican and cormorant among them.

132 The region is one of very low rainfall, limited to the hot summer months, in some places occuring only a few times in a year. Winters are chilly and dry with persistent winds and dust, with the temperature falling down, on rare occasion, to just above the freezing point. Summers are intensely hot, with daily temperatures usually over 100 and the water temperature of the sea along the shore not infrequently as much as 85 degrees. There are great differences between diurnal and nocturnal temperatures, very much influencing the desert life.

134 Within this region there are several different ecological zones or perhaps sub-zones, varying from the alkaline flats like Playa Noriega, and the alkali-and salt-permeated soils of Desemboque to the more bountiful slopes of the mountains and the irrigated mud-flats around Hermosillo.

121 For the sake of distinction, I have selected several of the typical localities or zones as a point of reference either because of their ecological distinctions or because of their signficance as a landmark, readily delineating a peculiar habitat. Personally I am familiar only with some of the

I

INTRODUCTION

121 localities, but I think it is advisable to include others, whose nature is not so different from the main places of Seris' habitations.

361 I have selected then 25 localities and I shall give their main characteristics below:

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1. **Punta Peñasco** — a village along the upper shores of the Gulf of California, close to the U.S., [491] connected by a paved highway from Gila Bend. Typical Sonoran zone with extensive sand flats. Very rarely visited by the Indians.

2. **Porto Libertad** — rocky shores, located some 30 miles north of Desemboque. A Mexican village frequently visited by the Seris.

3. **Desemboque** — Seris' main settlement after 1940, just north of and around Punto Tepopa, only a few miles from Tiburon. A narrow strip of poor land, thoroughly permeated with alkali and salt. Vegetation is very sparse. The mesquite, elephant bush, creosote bush, *Cholla* and *Sahuaro* are the main trees. No *Palo Verde* or *Palo Fierro*. *Ocotillios*, *Sahuaros* and mesquite are stunted and scarce, only toward the mountains increasing in [172] frequency and size. Along the shores, sand dunes with kitchen middens, partly covered by vegetation. An arroyo nearby is empty except on a few occasions during the year when flash flood after rains rushes through. Rainfall very scarce. During the summer of 1953 I spent there, it rained very little—only twice and that was short and feeble. [312] Water is obtained from a well, near which there is a Mexican ranch where, owing to irrigation, some vegetables are grown and weeds are present such as *Datura*. The coast is largely rocky. Narrow beaches lack wide sand bars. Hence the fauna here is poor.

4. **Estero Sargente** — alkali flats and mud flats some 25 km. south of Desemboque along the coast. Vegetation very scarce. *Sahuaros* and *Ocotillios* and other desert trees grow some distance from the shore. Short grasses in some places clump the coastal dunes. Breeding and feeding place of many shore birds, especially of willets and egrets. On the alkali flats near the shore are many peculiar insects, not found in Desemboque, particularly tiger beetles and Oedemerids.

5. **Campo Vivora** — little more than half way down toward Desemboque from Estero Sargente, also along the coast. So named after supposedly [103] numerous rattlesnakes. Clumpy grasses. Favorite encampment of the Seris and others while fishing and hunting turtle. The only loggerhead turtle I have seen was right here.

[491] 6. **Porto Kino** — fishing village directly due east of Hermosillo, nowdays connected with Sonora's

[P. 1 [illegible]

361 13 [491] [166] capital by paved road. Formerly, in the twenties and early thirties, Seris' chief mainland settlement. Now with the influx of the Mexicans, the Seris deserted the place completely as a camp site, although they still visit it occasionally. Distinct in the extensive sand beaches and sand marine flats which harbor peculiar bird, fish and insect fauna.

7. **Guayamas**—southernmost point considered here and probably also of the Seris' historical extension. Nowadays very rarely visited by them and probably only while cruising with the Mexicans. Large settlement, many tourists. Backlands; rocky desert.

8. **Tepopa** —spectacular rocky head just south of Desemboque, opposite to Tiburon. Caves, usual mountainous vegetation, *Sahuaro*. Many Seri hunting encampments and one of the places where the Sonoran bighorn is still hunted.

9. **Coast of Baja California** — very rocky area across the bay—almost never visited by the Indians.

13 10. **Tiburon** —island in the Gulf of California separated from the mainland by a narrow channel called "Infernillo," only a mile wide. Rugged, mountainous. By **Tiburon** is meant an overall island area in distinction from **Tecomate** or the mountains.

[361] [221] 11. **Tecomate** — a water-hole and Seri campsite on the northern shore of Tiburon. Today this is the only permanent site on the island where these Indians, actually only a few families among them, still go to live for part of the year.

12. **Mountains of Tiburon** — rugged interior of the island, reaching up to almost 4000 feet. Usual vegetation cover with *Sahuaro* and other typically Sonoran floral components, fauna much as on the mainland except lacking cougar, bighorn and some other larger forms. The interior does have some "tenajas," that is water-holes and there is said to be a rivulet up in the mountains.

13. **Infernillo**—narrow channel between Tiburon and the mainland, often called locally "canal." For the terrestrial fauna and for birds reference is made to the mainland shores of Infernillo. For the marine fauna is meant either the open water in this channel or to the littoral off the mainland. The opposite shores and littorals are covered as "Tiburon." Maximum depth is said to be up to 25 fathoms.

14. **Isla Patos** — small island north of Tiburon and directly due west of Estero Sargente and halfway between Tiburon and Punto Tepopa. Visited by the Indians only occasionally, mostly in connection with the duck hunt. [223]

15. **Isla Raza** — a small island between Angel de la Guarda and San Lorenzo.

16. **San Esteban Island**—a round island between Tiburon and San Lorenzo, up to 1700 feet elevation. Visited occasionally during fishing or turtle hunt trips or in search of a chuckawalla. [221]

[P 2 A]

13 17. **San Lorenzo Island** — a narrow long island along the coast of Baja, California, and opposite to Tiburon. Altitude up to 1200 feet. Fauna limited, owing to the distance from the mainland. Vegetation much as elsewhere but impoverished. Visited incidentally as is San Esteban.

[312] 18. **Angel de la Guarda** — large island along the coast of the peninsula, longer but narrower than Tiburon, slightly lower at its highest point, pretty much waterless. Vegetation as elsewhere, fauna limited. Visited by the Seris very rarely.

19. **Desemboque (Mountains)** — high mountains immediately back of Desemboque, 5 miles away, rising perhaps to 1200 feet. Vegetation much richer than in Desemboque, with giant *Sahuaro* growing to considerable size. More moisture than immediately near the sea-shore. Full Sonoran fauna with cougar and bighorn. Frequently visited during hunts.

20. **Tepopa (Mountains)** — in distinction from Punto Tepopa as a whole, this refers only to the rugged head. The mountain reaching to over 1800 feet. Thus by Punto Tepopa are meant only the shores and the littoral.

[312] [361] 21. **Buena Vista** — a ranch inland on the way to Hermosillo, newly deserted. Water present in the large well and periodically in the dry river. Willows, large mesquite, Palo Verde, etc. Now only incidentally visited by the Seris but formerly of some importance as a camp site.

[361] 22. **San Francisco de Costa Rica**—a ranch inland halfway between Kino and Hermosillo near the main road, presently a large Mexican ranch. Formerly a frequent Seri campsite. The distinctive feature of this locality is extensive sandy areas with very peculiar fauna.

[484] 23. **Hermosillo**—capital of Sonora of some 40,000 people. Extensive agriculture, irrigation, river and water-dammed reservoir and cattle and cotton ranges. Once the Seris ranged almost as far as this town but presently they come here only on special business, to the hospital or for a ride to town, with the Mexican truckers. Their observations in Hermosillo are only incidental.

[484] 24. **Nogales**—U.S.-Mexican frontier town. Seris come here very rarely and only certain individuals. Observations less than incidental.

[484] [464] 25. **Campo Utah** — large track of irrigated flat lands given up to cotton, operated by the Utah Construction Company between San Francisco and Hermosillo. Somewhat off the main road. Selected as a distinct region owing to the irrigation and cotton fields with their ecological peculiarities. Seris visit this only in transit or on most unusual occasions when they work a few days for the Mexicans.

The Problem

121 The basic problem concerns the state of Seris' zoological knowledge, that is the general knowledge of the natural history of animals in its main outlines; of their ecology, habits, reproduc-

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121 tive behaviour, migrations, predation, distribution and the like. Existing ethnographic sources on the Seri barely touched on these matters and 114 such information as is available concerns only a few economically important species and even 121 then concern only the economy and fragments of myths in which animals are involved. This is not surprising. To my knowledge, there is not a single publication in existence dealing with the aboriginal knowledge of natural history as such, certainly not in the North American literature. Much less, yet such an approach had been followed in the standard ethnographies under the heading of "ethnozoology." It has been left to the ethnobotanists (Whiting on the Hopi, Chamberlin on the Gosiute, Robbins *et al.* on the Tewa are the best examples) to attempt something along these lines, but even this is on a limited scale.

121 Since the material for the present study has been obtained with this in mind, it inevitably suffers from the limitations imposed by the outline of the problem. The Seri material has been gathered as one of the series of studies undertaken among the selected Indian tribes (Sumu, Cora and Karajá are others) in order to have comparative material from cultures different in their basic economy and occupying different ecological niches. Thus, an analysis of the Seri material alone further limits the application of it and the conclusion one may draw from it.

The main intent then is to form an orderly and analytical presentation of the material which later may serve for comparison with the analogous material gathered among other tribes.

What then can be done with this type of material and what is the purpose of such work? For this, several different answers can be offered. To begin with, the factual data on the aboriginal knowledge of natural history of animals is sadly neglected. What there is, is fragmentary. Ethnobotanies outnumber ethnozoologies in the North American literature by better than six to one. Thus the present work and also other work I have done along these lines will fill in a gap in our knowledge.

Secondly and more importantly, this work, I believe, suggests a very novel approach toward ethnozoology, the sort of approach so far untried. This sort of systematization of the zoological knowledge among the primitives, makes a comparative approach possible, much as we have comparative studies, for example, of the social organization or of the political systems. In other ways such systematization also makes easier the internal analysis of the material.

Another important angle in this work is an attempt to relate aboriginal natural history knowledge to the general economy and to the natural environment. This is phrased as a question: how does the general economy of the people influence their knowledge of the natural history of animals? Specifically: what is the extent of their knowledge of various animal groups and how does this knowledge increase or decrease relative to their general economic preoccupations? Also: how does the general natural environment, climate espec-

121 ially, limit the possible uses made of different species; how does it limit the knowledge of animals' natural history? How important are animals in their economy?

Such efforts to connect various phases of culture with the environment had long been practiced by archaeologists, but these lessons were largely lost on cultural anthropology, which, at present time, insists on concentrating on the social factors in splendid isolation, either from the natural environment or from the fact that man is a biological organism first and last. However, considerable revival of at least the ecology—stressing studies is quietly taking place in culture anthropology, viz: Kirschoff, Steward, Leonard Mason, to mention only a few of the contemporary students, and, of course, Kroeber and Sauer who stressed this approach long ago. But as Julian Steward (1938:260) points out, cultural and environmental relationships cannot be answered in a blanket, ready-made statement. Each of the ecological determinants must be examined separately as an empirical fact, and this is what I attempted to do. The Seri material alone indicates where the ecology is a limiting factor and to what extent, and where it is not. In the end, such study as I have undertaken should contribute to our understanding of man's relationship to his natural environment and his adaptions to it as well as his ability to escape from it.

Finally, this type of work indirectly suggests another line of questioning. How does human scientific knowledge evolve, and how is it formed? A set of comparative studies of this kind inevitably suggests some patterns in the evolution of men's biological knowledge. In this it may be of much interest to the zoologists or to the historians of biology. For in the knowledge of these simpler people we find our own predecessors historically, sometimes not so far behind us. Some of the Seri concepts are no less developed than those of the earlier Western naturalists, quite on par with the work of the 16th century men like Gesnor or Aldrovandi. In some ways even as superb as naturalist as John Ray who really laid the foundation for systematized natural history was not much ahead of them. As to the question of how such knowledge is formed, the problem is one for a psychologist and here, at best, only the barest suggestion can be found.

These are than some of the problems and questions which this study seeks to answer.

On the other hand there is a great deal that this study cannot do owing to self-imposed limitations, and there is a great deal which it can only hint at or answer in a most fragmentary manner. For example, there is no use to attempt functional analyses of the naturalistic concepts in the Seri culture. To do this, considerable extra field work would have to be done, with just this point in mind. The existing literature, owing to its diverse origins and approach and owing to its fragmentariness, is of little use. Nor can this study answer in a general way how the Seri knowledge of natural history developed. To anwser this adequately one would have to have first, the

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121 documentary data and second, also the archaeological data. The subject matter unfortunately [172] is absent from the first. As for the archaeological data, there is none as yet to date for the area [114] except Giffor's unpublished manuscript. Nor have we the kind of ethnography that would be of help—not until ethnographers will pay greater attention to the naturalistic knowledge of the people. Nor can the matter of the Seris' cultural connections be undertaken with the present material with any degree of reliability, simply because no such material exists for the neighboring group.

However, few suggestions outside the limitations and the main object of the present analysis can be made. From the fragmentary data available I shall try to show the change in utilization of animals by the Seris. I think I can also indicate a few points in support or denial of this or that idea of the Seris' cultural connections. I can also suggest the direction of the attitudes toward animals in the Seri culture, in a sphere which normally we assign variously within the domain of religion or world view. I can also indicate some of the major changes in the Seris' exploitation of general environment. All these can be suggested only fragmentarily, as only small bricks toward a generalized structure of our knowledge of the Seri culture. To this extent the present analysis should be helpful to the future student of the Seri culture and to our general understanding of it.

Procedure

114 The field work on which this material is based has been done during the summer of 1953, June-September and again for one week in May, 1955. [164] The second visit took place at a most inopportune time, amidst bad measles, dysentery and a flu [166] epidemic which completely disorganized the tribe and persuaded most of them to flee Desemboque into the coastal desert.

The work was accomplished mostly in Desemboque, the Seris' largest and most permanent settlement after 1940 where most of them lived. Occasional side trips were undertaken later to Hermosillo, Estero Sargente, Campo Vivora, Tiburon and some of the other places mostly with the view of evaluating their ecological nature and for the observation and acquisition of the zoological materials not available in Desemboque. These trips had been undertaken in the company of the Seris who then also doubled up as informants.

124 [126] During the first two weeks of my stay in Desemboque, I did no interviewing but concentrated on the collections of zoological material, occasionally and informally asking for the name of this or that animal. After two weeks regular interviewing work was commenced, first with an aid of Mr. Leo Sandoval, Mexican, U.S.—educated school teacher, but later on entirely without an interpreter. There are sound reasons for this practice. Direct questioning allows the interrogator to evaluate the replies in their less obvious nuances, the reactions of the informant to the question, his hesitations, uncertainties and the like.

In the event of well-known animals with those colloquial Spanish name everybody, Mexican and

[P.49]

124 Seri alike, is acquainted (Cougar, Jaguar, Whale, etc.) questioning had been done by referring to such and such beast without the use of pictures or actual specimens. This procedure had been followed for the majority of mammals, which are well enough known in the area. But otherwise, questioning had been done with actual specimens in hand, alive where possible. This was owing to [825] the fact that response may be different to the dead specimens than to the live ones and grew out of a conviction (entirely substantiated in the course of work) that many animals, of a small variety especially, are recognized more by their distinctive behaviour pattern, flight, selection of habitat, voice, running posture, etc., than by the shape and form alone. All invertebrates, all reptiles and all but the best known and largest fish had produced the data from actual specimens, dead or alive. Finally, where neither common colloquial name nor specimens were available, I resorted to pictures. That way I obtained data for a small number of animals and for a good many birds. This method has its weakness. The line drawings in the excellent guide to the *Birds of Mexico* by Blake I used are somewhat on the "dead" side and may be good aid in bird identification to someone who also will read the text, but they often fail to be of much use to someone who rarely has seen the drawings in any book, let alone a bird guide. From the replies it was obvious that a certain amount of misidentification took place in the naming of the birds or mammals from the sketches. I took account of this and eliminated from consideration all those forms where misidentification on the part of the informant was obvious. This in itself may be a worthwhile object of study but it was not my concern at the moment.

In working with the informants I studiously avoided giving them any suggestion that I already knew what the animal was or that I had a fair idea about the general features of its natural history. This is especially important in considering the Seris' knowledge of the animal distribution, ecology and other salient features. When available, I often brought along specimens of species I knew did not occur in Desemboque which had been captured elsewhere, in the absence of the Seris. This was in order to test better their recognition of animal forms.

115 Altogether 10 informants had been used. Of these the bulk were questioned in 1953, some again in 1955 and that year Chico Romero, now an old man of over 70, had been also added to the roster. Chico was Kroeber's star informant in 1930 and from him came the bulk of Kroeber's original information.

The two main informants were Miguel Barnett, then aged about 45 and one of the Seris' best hunters, and Jose Juan Moreno, a fellow about 25, recognized as their best fisherman. As expected, their preoccupations and interests slanted their replies. Accordingly, Jose Juan had the best knowledge of the marine animals and Miguel of the terrestrial animals. Jose Juan aided me again with some information in 1955.

[165] Other informants were as follows: Juan Torres, aged 40 or so; Ramon Montayo, one of the

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115 [165] oldest Seris then alive of over 70; Ramon Corrales, claiming to be 37 and on the dim-witted side; Jesus Montanyo, a quiet, cooperative man of 21; Natcheo Molina, aged 35 or so, whose interest in the protestant hymnals was unfortunately far greater than in giving me the information I wanted; Jose Manuel Romero, about 37 years old on his own claim; and Jose Barnett, Miguel's son, 825 aged 14. Inclusion of young Barnett was a lucky strike because it indicated clearly differences in the natural history knowledge between the older men and the young men, later confirmed also in the incidental questioning of several young boys. [868] Young men start out with general interest in animals of all sorts, including the small invertebrates, but as they grow up they end up with solid knowledge of economically important species and slim, forgotten knowledge of the insignficant invertebrates.

124 I made an endeavor to obtain the same sort of information from several informants in order to eliminate as far as possible aberrant answers or peculiarities. The most solid information is available for the mammals, which are, of course, well-known. Here in some cases the same kind of information had been obtained from five individuals. In other instances only two to three were available and sometimes only one. What was surprising about the information given were not the differences, which I often indicated in the text, but the amount if identical agreement on almost every single item of data between different individuals.

Since it was impossible to obtain information on all animals from the same individuals, the questioning proceeded in "blocks." By this I mean, I would question for example two individuals about the entire order of mammals (every species of them) and another two on the birds. Two other individuals then would be questioned on half of the birds and half of the mammals, while the other two on half of the reptiles and half of the fishes; still another two on half of the insects and half of the marine invertebrates, while others would yet cover all of the insects or reptiles or fishes independently. This I believe is a useful procedure. It allows to test generalized concepts of natural history for several individuals for diverse groups. It is motivated by the question of no little importance. What does so-and-so know about mammals and what does he know about birds? [825] What are his generalized ideas of each group? It had been soon discovered that when it concerns special points, the informants were apt to have standardized notions of what the animals did, regardless of the actual situation. The less actual observational knowledge they actually had, the more frequent were pat replies. Obvious demonstration of this helped a great deal to eliminate such pat answers or to recognize them for what they were and to account for them in the final analysis.

000 Another point in the procedure is of par-

[P.5A]

121 Another point in the procedure is of paramount importance in this type of research. Fair
[129] general knowledge of practical field natural history can have no substitute. The investigator must have this basic knowledge, to realize the range of possibilities in the answers and identify any answers not commensurate with the actual events. This way, even without interest in the mythology, one may get on the track of a myth. Although, in
825 general, anthropologists seem to think that natural history knowledge of the primitive folks
121 must be ridden with the mythology and must be different than ours, my rather extensive field work persuaded me that this is not so at all. Mythology there is, if one looks for it. But the bulk of their knowledge is based on sound obervation as anyone acquainted with the natural history will readily discover. One must be able to disentangle the two qualities. That this is so is well indicated in a large number of animals where the informants simply replied to queries on this or that subject in the usual *quien sabe*. And indeed, the more obscure the subject, the more likely one got that sort of an answer.

128 In the analysis of the actual material a certain schematic programme has been followed. For the sake of convenience, material has been grouped according to the major divisions of the animal kingdom. Some may object to this saying that this is just our way of classifying animals but that aboriginal classification does not follow these lines. For certain purposes, this may be true, but for my own purpose I find my procedure more convenient. Regardless of the hypothetical native mode of classification, one may form a question.
128 How do the Seri distinguish different mammals? I may say also that our own groupings are not
825 different from those of the Seri or any other tribes. Their recognition of differences among animals may be at times hazy or from our point of view erroneous. But by and large, birds to them are birds and snakes are snakes and even within the insects, without actually naming differences, they tended to group together insects according to their order. Exceptional cases, bat, whale and the like, remain exceptions just as they were to the early Western naturalists, the 16th century Gesner or Alrovandi, for example, to whom their place in the scheme of nature was based on the analogies. But this didn't prevent these men from grouping other animals much the same as we do. In the same way, the South African Bushmen may regard Mantis as a supreme diety, but this does not prevent them to say that it is also like an insect.

128 The scheme I followed turned out useful. In the end I have obtained generalized ideas on the salient features of natural history of different animal groupings which I could compare with each other. The internal evidence is most interesting, more so that in some details it differs qualitatively and quantitatively from the materials I have gathered among other tribes.

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II

[P.6A]

OUTLINE OF SERI CULTURE

Territory

131 Historically the Seri territory at its greatest expansion extended from the coast of Mar del Cortez to Hermosillo and from Porto Libertad to Guayamas and included also the Tiburon Island. 101 Ethnically, the Seris represented a collection of dialectically distinct tribes, the Guyma, Tepoca, [197] etc., perpetually at war with each other, whose common characteristic was their culture, and who were framed in to the north by the Pima Alto and Papago, to the west by the now extinct Cochimi, to the east by the Opata and Pima Bajo and to the south by the Cahita, Mayo and the Yaqui.

648 But their area had fluctuated much. After the bitter and disastrous wars against the Mexicans 131 from the late 18th century through most of the 19th, the Seris lost out and were forced by the Mexican government to settle on Tiburon. This incarceration did not last long. McGee had already in 1894 found them on the mainland and Kroeber found them equally divided between Tiburon and Kino. In 1930 when he visited, evidently they lived largely in Kino Bay. As the Mexicans pressed on Kino moving in, in ever greater numbers, and as Japanese fisheries worked the Gulf out of Desemboque attracting the fish-loving Seris, their main settlement has moved once more. About 1940 most of the Seris moved into Desemboque and at the time of my visit, almost all of them lived [361] there while only two families made Tiburon their "permanent" camp. School and availability of the medical facilities as well as the location of the Mexican traders in Desemboque, part of whose scheme the Indians have become, attracted the Seris. Only occasionally today they roam inland or visit other areas, either owing to the hunting or fishing expeditions.

Numbers

161 Seri numbers fluctuated as much as their territory and had suffered immense diminution. I shall list the estimates below, indicating the source of the information:

	Authority		Source
1780	Velasco	2,000	McGee
1824	Troncoso	1,000+	"
1826	Ratio (Tiburon only)	1,000-1,500	"
1826	Hardy	3,000-4,000	"
1841	de Mofras	1,500	"
1844	....	550	"
1846	Velasco	500	"
c.1855	Encinas	500-600	"
c.1865	"	250-300	"
1894	Mashem, native	250-350	"
1930	Thomson	175	Kroeber
1934	Mex. En. Cifras	160	Ethn. Synth. Mex.
1953	Smith, Jr.	248	MS. Univ. of Ariz.
1955	Malkin	236	Malkin

II

OUTLINE OF SERI CULTURE

161 164 At the moment their number should have increased again, after a disastrous epidemic in the spring of 1955.

Biological Background

142 The Seris are somewhat atypical among the peoples of the general area in that they represent a very slender, sinewy, tall type. This is true of both men and women. This physical type in general is apt to be associated with the desert habitat and the Seris answer the requirements very well. As shall be seen, their economy also represents characteristic adaptation to the desert conditions of pre-agricultural people. 433

Economy

The Seris readily fell into the category of the pre-agricultural hunters and gatherers with one variant, dependence on the produce of the sea, whether marine turtles, fish or littoral invertebrates.

[241] [648] [464] Here the Seri provide another exception for the region. They are the only group that never had any agriculture. McGee has pointed out their lack of agricultural sense and this has also been mentioned by Kroeber and by incidental Mexican visitors. Of late years, some efforts have been made by the Mexican government and the American Friends' Service Committee to persuade them toward agriculture, but to no avail. The Seris occasionally hire out to the surrounding Mexican or American rancher-farmers but grow restless after a few days of cotton picking and retire, with their advanced pay lost to the employer. On the other hand, efforts to teach them related practices, well digging for example, also failed to interest them. To this day they remain much in the original pattern of economy.

262 114 McGee (1898:214) who had a chance to observe them from the first hand and who also had access to valuable information from the outsiders gives the following figures for their diet:

land game, large and small (incl. stolen stock)	21%
waterfowl and eggs, incl. pelican	13
sea-turtles	25
fish	15
shellfish	10
cactus fruit	9
other plants	6
miscellaneous	2

total animal 84% marine 65%

Kroeber (1930:20) questions these figures and thinks that shellfish represents greater percentage than McGee indicated. He also thinks the use of turtles had been exaggerated. He figures the dependence on the animal diet as 75% and on marine 60% but he suspects that these figures are too high for a band with ready access to countless cacti and mesquite.

[P.6B]

262 178 I have no idea, of course, what the diet may have been in the past since only archaeology can suggest the answer. But I am sure that there has been much change in their diet since Kroeber saw them, not in the basic pattern but in the com- [177] position. With the introduction of hook and line fishing, the percentages swung in favor of fish, [226] while decimation of the marine turtle cut down the importance of this animal. Simultaneously, the Seris now have available manufactured or 262 imported Mexican food items: flour, sugar, rice, [177 434] potato (when no one is looking; potatoes are not supposed to be sold to them because they make *tepache* from them which makes them grossly ½ fish in cans, coffee and tea. Dependence on the products of the desert has dwindled. Rattlesnakes, desert turtles and chuckawalla still find their way to the Seri kitchen but not too frequently. Pelican and sea gull will be eaten only when rough times beset them but are disdainfully refused at other times. My own estimates, impressions not supported by any attempt to measure their diet, are as follows:

fish	50 + %
turtle	8-
Mexican import	20
desert plant	7
desert land animals incl. stock	5
shellfish	10
total marine origin	68 +
total desert origin	12
imported origin	20

224 178 [685] Another important change in the pattern is the unquestionable decrease of hunting (other than marine animals) in Seri life, as of the domestic stock stealing, the place of which has been taken in a way by the dependence on manufactured foods and items. Hunting nowadays is done rarely and only few individuals will devote some months out of the year to it. [685] Stealing of domestic stock has ceased for practical purposes, since in the past it lead to virtual extermination of these Indians. Occasionally the Seri kill off a semi-wild burro, herds of which run about loose in the desert or they'll get leavings off one, hunted down by a Mexican trader or fishermen.

411 224 The Seris' basic tools of game procurement have changed. Bow and arrow were still much in evidence and in use in McGee's time but seem to have gone out soon after. Kroeber did not mention them [857] and by now they are quite extinct, except as clumsy toys little boys use to play with. The throwing stick is still used on rabbits—any stick one can scrounge on a moment's notice will do for the purpose. If any traps or falls had been used we do not know of them. Accidental stones may be used much in the same way as throwing sticks. In general, [177] various sorts of fire arms, mostly .22 and .38 caliber are owned by a good many Seri men and have replaced other weapons in the terrestrial hunt.

226 411 177 More important are changes in the fishing procedures. Formerly spear and detachable harpoon were their only marine weapons. Even as late as 1930, during Kroeber's visit, the Seris made no use of hook and line. But now, hook and line of

[P. 7A]

pparently a line of type has been omitted here-Analyst]

226 commercial origin are their main instruments of
fishing. To this they added dynamite, sometimes
411 with disastrous results to themselves, mostly as
a way of securing bait. Single-pointed fish-spears
177 which loomed so importantly in McGee's account
have gone the way of the Dodo for its original
purpose and transformed into iron bar lances,
now used largely as weapons against rattlesnakes
that men encounter in their desert roamings.
However, in the forties, when the Seris spent a
great deal of time getting sharks and huge rays,
they killed them with these weapons.

226 What retain some importance are the harpoon
and the two-pronged spear called "puiero." The
411 two-pronged spear is one of their oldest weapons.
The construction is much the same as when McGee
visited them. The spear is used mainly to stab
large-size fish, the giant *bais* or *mero* for example,
after it has been brought up on the line. The
[225] harpoon is now exclusively a weapon for the turtle
hunt.

An interesting fate met an effort to teach these
226 Indians net fishing in 1947. They tried, ruined
177 the nets and never took it up since. The instigators
were Mexicans, the fish traders. I suspect that
[157] Seri individualism had a great deal to do with
their lack of interest in net fishing which after
all demands a certain amount of cooperation. With
the hook and line fishing, men can have much more
their own way.

501 An added "tool" of the Seris is the plank
177 boat. The balsa which McGee still observed dur-
ing his visit, had already vanished by the time
648 Kroeber came to the Seriland and had been
replaced by these boats. The boats are flat bot-
tomed but good sized. The material was provided
by the Mexican government. Boats are usually
propelled by 5 hp. motors leased from the
Mexicans (no Seri is rich enough to purchase
[439] one) who also sell them gasoline and oil at exorb-
itant prices and in return buy Seris' catch of fish
and sea turtle for low prices. At the time of my
visits these amounted roughly to less than a peso
[435] per kilo of the flayed, degutted and cleaned fish
(less than 8 cents) with fluctuation up and down
the scale depending on the kind of the fish, and
to about 30-50 pesos for medium to large size
"cahuama," the live marine turtle.

501 The Seri boats are also propelled by paddles and
648 sail—this is always the case with the families who
wish to stay away on Tiburon for some time.
The Mexicans will not lease them their motors for
such trips even if the Seri, some of them at least,
have enough knowledge of the motors to repair
minor stoppages—a demonstration of the fallacy
[114] of McGee's idea that they are genetically unable
to handle tools. In this respect, Kroeber's (1930:
25) estimate of them is closer to the truth.

462 Sexual division of labor in procuring food goes
on, much the same as it had 70 and 30 years ago,
with the sole exception of the imported goods.
[439] Here purchases are made either by men or wom-
en or by children, depending on who at the time
has the cash and what one wishes to buy.

Fishing is still done by men and so is hunting.
Women still concentrate on gathering, whether of

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462 desert plants or littoral fishlets from tide-pools
or of the shellfish. Both men and women will
[224] bring in an occasional rattler, although women
are more likely to do this because they spend more
[857] time in the desert. Children of both sexes are
engaged in the female occupations here, but ado-
[883] lescent boys already join in their fathers' hunts
on land or sea.

342 Housing has undergone some changes. In the
184 desert or on Tiburon the Indians construct the
kind of shelter they did in the recorded past,
an ocotillo frame, bent over in the middle and
covered up with dried plant debris and twigs
from the desert, or with the sail cloth. But in
Desemboque they have more substantial houses—
of wattle and adobe, with flat roofs, rectangular
or square, often with corrugated tin or drift
planks and other debris piled up on top, or along
the walls.

178 In the remainder of their material culture, not
much has been left from years past although one
must remember that from the very beginning of
recorded Serian history it has been of a most
[291] meager sort. Pelican robes, which some Seris ap-
[412] parently still wore in 1930 are gone for good.
So are the stone tools. So is the pottery which had
[323] probably disappeared in Kroeber's time. The hu-
man hair necklace with rattlesnake rattles is also
[301] a thing of the past. The rattlesnake skin belts
[291] McGee (1898:170) described and figured are
probably all gone. I havn't seen or heard of any.

412 But what remains much as they had been in
1894 are the bone-awls. These are made of burros'
285 carpals and the blossoming of basketry, owing to

[P. 8A]

412 285 301 the stimulus of the tourist trade, has kept this tool alive. Another survival from McGee's times are *Olivella* shell necklaces.

Seri Antecedants and Relationship

174 For complete lack of archaeological information, little can be deduced about Seri antecedents. Speculations can be made only on the basis of similarities of their post-historic cultures with the cultures of the surrounding tribes.

171 174 [172] Individual traits between the Seri and their neighbors show discordant connections. Comparative data assembled by Kroeber, Beals and Driver & Massey suggest almost equal possibilities of derivation from the Cochimí, the Gila, Pima and the Yuman tribes but favor much less connections to the south. Much is made of the basketry. Archaeological basketry has been unearthed since the work of Kroeber and Beals was published (Massey, MS.), but it is different from the Serian. Seri basketry shows closest relationship to Pima-Papago complex (Malkin, MS.). But part of this may be not only post-historic but certainly very recent and is hardly an argument in favor of the Pima-Papago connections.

Kroeber (1930:5) thought that on the face of it, the Seri showed greatest affinity to the Cochimí on the grounds of their general development of economy—the hunting and gathering subsistence. But he also pointed out that relationship with the Cochimí may rest ultimately on the linguistic analysis if the Cochimí language can still be recorded—which is most dubious.

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III

MAMMALS

136

Scientific	Common Name
Antrozous pallidus	Pallid bat
Bassariscus astutus	Ringtail cat (Cacomistle)
Spilogale gracilis	Spotted skunk
Taxidea taxus	Badger
Urocyon cinereoargenteus or Vulpes macrotis	Grey fox or kit fox
Canis latrans	Coyote
Felis concolor	Mountain Lion.
Felis onca	Jaguar
Felis eyra	Juguarundi
Zalophus californianus	California sea lion
Dipodomys sp.?	Kangaroo rat
Erethizon dorsatum	Porcupine
Lepus californicus	Blacktailed rabbit
Sylvilagus audubonii	Desert cottontail
Pecari angulatus	Peccary
Odocoileus hemionus	Mule Deer
Ovis canadensis	Bighorn
Eschrichtius glaucus	California grey whale
Orcinus rectipinna	Killer whale
Tursiops gillii	Bottlenosed dolphin

136 128 Identification here has been obtained largely with an aid of field guides or by mentioning a colloquial local name of the mammal in Spanish. All these were later checked by Dr. Robert T. Orr of the California Academy of Sciences. While there is no doubt of the identity of the most common forms, such as peccary or sea-lion, there are also several of the identifications which can't be certain either because of inadequate line drawings or lack of specimens, either alive at a distance or even parts of them. In this somewhat dubious category are Ringtail cat, Jaguarundi and the Killer whale.

On the other hand, there is no doubt as to the identity of the following: Pacific pale bat, badger, bighorn, coyote, kangaroo rat, blacktail rabbit, cottontail jackrabbit. deer and dolphin. Live, free or captive individuals, or part of them, such as horns, hide or skulls were available.

Economic Uses

262 Food: Only 6 out of 21 species for which information is available are used today as food. Three more were mentioned as "eaten in the past" and one more as "possibly eaten in the past." Since the oldest of the informants who provided [115] this data, Miguel Barnett, is a man in his fifties (and it is he who talked most often about the animals "eaten in the past but not now") we may surmise that these were part of the Seri diet 25-45 years ago, that is between 1910-1930.

Five species are important as a supplementary source of food: the bighorn, the deer, peccary and both species of rabbits. Some, the deer especially, are considered to be delicacies. The sixth species is the badger but it appears neither important nor frequently killed. I saw one badger captured by José Juan Moreno. The animal was tied to the [231] pole, and kept as a pet, fed on fish, snake and

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III

MAMMALS

262 [231] water for a week until it escaped. There was no intent to do away with it and serve it up for dinner later on.

The 3 species reported as eaten in the past are kangaroo rat, sea lion and the ringtail cat or [252] cácomistle. Of these the little rodent had been supposedly "boiled in hot water with salt" which [261] method of preparation may indicate that it happens quite recently yet. It is quite possible that in times of famine this animal is still used. The sea [432] lion has been reported as "eaten once a long time ago. All of it. But not now. Its hide was once sold also but now it isn't used at all." This conflicts [114] with McGee's statement (McGee, 189:202) that there was a taboo on eating sea lions among the Seris and there is no way to reconcile the information.

[114] McGee's report may be as truthful as are the uncertain and hazy comments of the present day Indians.

224 On the other hand, the cougar belongs to a very dubious category, unless we can rely on Miguel Barnett's memory. All 4 of the younger informants emphatically deny that the cougar has ever been hunted for meat. But Miguel Barnett claimed that this has been done in the past, although he could not tell how long ago. Kroeber says nothing about this animal and this makes it difficult to date the events. At the time of Kroeber's visit, Miguel was at least 25 years old and the cougar could have been hunted either then or earlier. But today the Seris do not eat the [262] flesh of the big cat and their abhorrence of it has been confirmed by the Mexicans to whom I talked about the subject, and who relish cougars' meat. This apparent distaste for the *el tigre's* flesh may [178] well be a recent development quite unconnected with the lack of weapons. McGee (1894: *loc. cit.*) casually mentions that the Seris hunt both cougars and the jaguars but cites no evidence for it. Yet [411] in his time Seris' almost only weapons were the bow and arrow and a lance which today has [177] been replaced by firearms. I am unable to explain this contradictory behaviour.

262 Finally, there is the Ringtail cat or cácomistle. Although this beast has been reported as part of the diet, the information isn't too reliable. I had no way of checking whether this was the animal [124] the Indians had in mind. Their description of it seemed to answer some other unspecified animal and their answers were confused. The fact is that the Ringtail cat does occur in the Seri territory and they are surely familiar with it.

Of the remaining 11 species none were ever mentioned by any of the informants as having been ever eaten. Their denial of eating the coyotes were most vehement. Coyote figures out probably

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Coyote figures out probably

262 [773] as an important and perhaps disreputable figure in the mythology although nothing but scraps and bits of information suggest this. It is possible that there is actually a taboo on eating this animal or perhaps it is so disreputable that eating its flesh would put a gourmant in an inferior position.

[224] [221] How important is the Seri mammalian diet is hard to tell. It certainly looms more heavily during the winter, because in the cool season hunting is easier than during the heat of the summer and in fact this is when most of it is done by the ardent hunters. Too, winter subjects the Seris to greater hazards and is apt to increase their dependence on the desert resources over that during the summer, even if these resources are scantier at that time.

[136] [224] To all of these animals one should add the semi-wild burros running about the extensive Mexican rancherias. The Indians poach on them frequently using their fire arms, usually the .22 caliber rifles. In any case, it appears that during the summer when the field work was carried out, the mammalian diet figures quite lightly on the Seri table.

252 [263] [251] [462] *Food preparation*: Very little is done in the preparation of the mammalian meat. All that I could observe was the boiling of it in hot water spiced with salt. The Indians were saying that in order to have the meat of a peccary, deer or bighorn ready to eat one must boil it 2-3 hours. The same procedure is followed with the meat of the burros. In contrast to this, as shall be seen later, fish are boiled as well as roasted while the turtles are also dried and salted. Preparation of meat is done by women, certainly at least in the encampments when they are present.

262 *Food preferences*: Some of the Seri food preferences have already been mentioned. At the top of the list as the desirables are the peccary, the deer, the bighorn and the blacktail jackrabbit; at the bottom is the badger, whose meat "is not much good." There is also preference by sex. Females of both the bighorn and peccary are preferred over the males "because they do not have the bad odor like the males." This sort of favoritism also occurs among the Mexicans. However, the Indians did not elaborate beyond this point.

237 178 [513] [291] *Other economic uses*: Apart from meat, hides are also used. The hides of the deer, bighorn and peccary had been used for sleeping mats although this matter has been expressed in the past tense. Miguel Barnett also suggested that the bighorn hides had been used for clothing by the Indians in the past—but he neglected to say how long ago. During Kroeber's stays, no Seris went about in the animal or bird (pelican) skins but earlier when McGee visited them they went about in these simple garments. Judging then by Miguel's memory, the use of the bighorn hide for clothing must be pushed back to the period of World War I or even earlier.[1]

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[1] Miguel Barnett indicated that the "fur" of the bighorn had once been worn for the cold season "but not now."

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237 [439] [182] On the other hand, the hides of all of these[a] three animals had been traded off to the Mexicans, but this again was now discarded. This would merely indicate the fluctuation of collapse of the demand from the outside rather than any intrinsic change in the Seri values.

[416] [181] Incidental use of the horns of the bighorn had been denied by all of the younger informants although admitted by Miguel Barnett. However, as I observed, the horns of this sheep are sometimes used as drinking cups. Several of them were lying around in the usual disorderly way of the Seris, now and then picked up for drinking and then again discarded. But the use of them struck me as most casual.

224 411 *Hunting:* Hunting takes a variety of forms and includes a variety of weapons, from .22 caliber and .30/.30 caliber rifles to spear, stone and throwing stick. Bighorn and deer are followed on foot but without dogs, probably because without dogs they may be easier to surprise. This hunt takes place in daytime. But the peccary is hunted with both the spear and the rifle and with a pack [231] [885] of dogs, and only by the adult men. There is an emphasis on the "adult," this surely owing to the certain amount of danger connected with the chase of the peccaries. The weapons of the chase dwindle to the throwing stick or a stone when it comes to the jackrabbit. Badgers, I was told, are also killed with the same weapons. But formerly, the informants said, bow and arrow was much instrumental in hunting the smaller beasts.

* 825 [224] Other animals, according to the Seris, are not hunted now, nor had they been in the past. Justification for this ranged from the usual "because it isn't done" to the more specific reasons. The skunk is "neither hunted nor eaten because it [225] stinks." The whale is considered "too big to kill" while the killer whale is "too fierce." The harmless *tonita* (dolphin)[1] was reported somewhat hazily as "sometimes killed" but the comments were inconclusive and were denied by other informants.

[224] Two other species had been reported as hunted in the past but not at the present time. The Ringtail cat was supposedly hunted with the slings while the sea lion was hunted down "with a rifle [225] or rock but not with the harpoon because of its great strength, it would break the harpoon." This, however, was "perhaps 25 years ago." Why the sea lion is no longer pursued is uncertain, unless there is again a lack of demand from the outside while the Serian economy is so much centered on fishing.

231 *Pets:* How many species of animals are kept as pets on and off is difficult to say. Like most hunting and gathering groups the Seris are fond of pets but their interest in them depends entirely on an accidental capture. Among the wild mammals of the region there are few that could be captured and tamed easily. The badger which I mentioned already was the only mammal I saw

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[237] [353] [1] I have seen bones of beached whales used for stools and also the skull of the *tonita* used as a chair. But it must be remembered that these animals got stranded on the beach. They were not deliberately hunted down.

[P. 10 B]

[a] [i.e. - deer, bighorn and peccary - Analyst]

231 which was kept around as a pet and it was interesting that the Indians who held it captive took considerable pains to look after it. This I noticed also with such few pet birds as they had. On the contrary, the large number of dogs which these Indians keep are left much to their own devices and are rarely fed. They are treated with lordly indifference and are treated as one Indian said to me "as you treat the dogs" which meant with a kick, stone and fist and forced to feed on the offal left on beaches. Yet, no Seri would ever think of deliberately killing a dog, [273] unless drunk. Although there is obviously little use for the dogs, each family keeps many of them. Sometimes as many as a dozen of these miserable curs live in the compound of one Serian family.

Taxonomy and Recognition

* 825 From the responses given, the Seri tend to split the mammals into two groups, the mammals proper and the group of animals which to them seem neither mammals nor fish. Evidently the possession of fur is of paramount importance here because it had been mentioned as a mammalian feature for several of the species. The Seri then put the *Cetacea* in a group of their own perhaps on these grounds. To be sure, the designation is somewhat hazy. The whale, the informants said, "is not fish nor mammal." The killer whale has also been referred to by them as a "whale-like animal." Finally, the dolphin one of the informants said was "like a shark. It lays eggs like a shark." But another informant thought it was "a mammal-like whale" although his response was obviously uncertain. That the presence of fur must be the main distinguishing feature is obvious in that they have no doubt about the mammalian position of the sea lion and that, while uncertain about the position of the bat, they are inclined to classify it with the mammals. As one informant put it "it can be of smilar kind to the coyote. It is not a bird because it has fur. Fur is not what the birds have."

Otherwise they are fairly good at the recognition of those individual species that are well known to them or that are frequently encountered in the area. The jaguar, called also *el tigre*, is known from hearsay only, owing to its extreme rarity in the immediate area of Desemboque. Porcupine is well recognized due to its peculiar features. But it must be rare and José Juan Moreno who saw it only once thought it was a "mammal." But he had no difficulty in recognizing a picture of it or associating the Spanish name *porcospino* with it. A somewhat moot point is the cácomistle. This animal evidently is not well known and, from the report, had been surely confused with some other creature. Finally, while the jaguarundi is surely found in the area it is also little known. Having to work with pic- [124] tures I cannot in any way verify the Seri responses, especially since the picture used was not of the best kind for the identification purposes. A Mexican trader had a multilated skin of one, but he sold it to a visitor before I had time to query the informants about it.

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Sex Differentiation

* 825 Only a few kinds of differences do the Seris recognize between the male and the female mammals. Size differences have been indicated for 16 species out of 21. Of these, in nine species male are supposedly larger than the females (sea lion, cougar, killer whale, mule deer, fox, kangaroo rat, peccary, badger, bighorn). In four species the sexes are equal in size (porcupine, grey whale, ringtail cat and the desert cottontail) and in two the answer was "I do not know." These last two are the porcupine and the skunk, both of which are rare in the Serian territory and it is possible that the rarity of the animal prevents the formation of any decisive idea on the subject.

No data had been obtained for the remaining species but from the general drift of the replies, the general trend would probably be similar to that for the rest of the animals. This trend is obvious. To the Seris, the male mammal is larger than the female and in most instances this is true. But there also is a basic conviction that this should be so. In the *Cetacea* actually the females are larger than the males in varying degrees, but even here the Indians asserted that the dolphin's and the killer whale's male is larger than the female, and in the grey whale the sexes are supposedly equal in size. Since these animals are [225] not hunted and only in the rare opportunity can the Seris examine specimens in the beached individuals the unknown situation then is covered by the blanket idea—the males are larger than the females.

In coloration no sexual differences were indicated at all. In such instances where the answer had been provided it has been pointed out that the colors of both sexes were identical. On the other hand, in some of the land mammals presence of "dos suevos," that is testicles in the males, has been indicated, in the coyote and fox in that number. Presence of a penis in the male is considered another structural difference in some of the animals, among them, the kangaroo rat.

In several instances size and weight differences have been indicated quite specifically. For the three most important economic species, the peccary, the deer and the bighorn, the figures in weight and size for both sexes came remarkably close to the actual dimensions of these animals. Reasons for the Seris' ability to estimate the weight of an animal will be explained later on.

Few other structural differences were given. The Seri recognize very well that the male deer bears horns for at least part of the year and that the female is horn-less. They also indicated the differences in the size and the shape of the bighorn horns, those of the male being large and curved, those of the females being small and almost straight.

No temperamental differences were indicated between the male and the female mammals, with the exception of the deer. Here the Seris say the males are very belligerent and engage in combat duals in November, the mating season as some of the Indians suggested. But they also said that the bucks rarely fought during the rest of the year.

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Age

*825 Some information concerning the hypothetical length of life of the mammals has been obtained for the majority of the species. The results show conclusively that the Seris have little knowledge of the subject and indeed no way to estimate what it is. In more than half of the species they simply didn't know what the answer was. In several others, their uncertainty was only too clear from the hesitant answers. I had an impression that here we deal mostly with guesswork, not based on any observation or even perhaps any forethought. Such replies as were given also varied greatly from species to species and also within the species depending on the particular informant. The mule deer may live then a year and a half or ten or fifteen years depending on the answers to the question; the peccary is said to live a year only, but the jaguar twelve and the whale and the dolphin, according to those at least who ventured to say something on the subject—25 years.

These answers at once show two things. First, there is little knowledge of the subject and second, there is a certain gradation of longevity proportional to the size of the animal. On the other hand, these answers are in no way correlated with the ecology and they can't be. The mammals are present throughout the year without regard to the seasonal changes, and with the exception of the bat, the whale and perhaps also the killer whale, they are not migratory.

Size and Weight

A contrast to the nebulousness of the Seri knowledge of the age of mammals is their responses to the questions of weight and size. They showed none of the hesitancy and indecisiveness. Some of the detailed differences concerning sexes (on this subject) have already been mentioned. As a matter of fact, the Seri gave readily exact figures for all but two species of mammals, the exceptions being the jaguar and the bat. Jaguars are so rarely seen by them that some of the informants had an exaggerated notion about the *el tigre* giving quite extra-ordinary figures for its size—quite certainly from hearsay. Of the remaining 19 species all but two were described in the figures both for the weight and for the size which are very close to the actual size or weight of the animal. The two exceptions are killer whale and grey whale. Here the informants guessed and in the case of the California grey whale gave the following figures: 35 meters long, four meters high and weight four tons. The size, of course, is very much more than the actual size, the weight quite a bit less—both obviously subject to guessing. But it is interesting that the dolphin has been correctly described in both respects, which only indicates the opportunity to take close look and lift the animal.

Seris' ability to estimate correctly the weight of an animal is not surprising but it must be a fairly recent development, ever since scales for weighing fish were introduced. The Seris do

[177]

[P. 12A]

*825 get paid for the fish or for the turtles at so much per kilo and they have the fish sealed for them on the spot by the Mexican fish traders. Some, in fact, developed a pretty good idea of the weights and have learned to make close estimates of the weight of the catch.

Their frequent attempts to guess the age of the animals even when they do not know it may well be in part due to their gambling talents. The [525] Seris are inveterate gamblers and it is possible that this habit enters into many other facts of their lives, not only at the games.

Development

According to the Seri, all mammals are born alive. On this subject there has been a remarkable uniformity of opinion among all of my informants. The only uncertain information concerns the porcupine where the informant who recognized this animal was unable to say whether it laid egg or whether it came forth alive. But as indicated, the porcupine is not well known to them and also does not resemble any of the familiar animals overly much. The size of the litter varied and in general corresponded pretty much to the actual situation in nature. Large litters, the Seris think, are typical of the coyote, the figure of 7-8 having been given by all informants which would indicate that this has been derived from actual observation. The coyote in this respect has been often referred to as "one like the dog." The kangaroo rat is next in line with six the most frequently mentioned number. Most other animals have a pair of offspring or only one. Bat, the Indians said, had two (which is just that). The killer whale is said to have only one. Interesting variation has been indicated in the bighorn. Here the ideas on the subject varied from 2-3 to one at a time. But one of the informants suggested that the female bighorn has only one young for the first time but at the next pregnancy delivers two young.

In general, the size of the litter has been indicated for the vast majority of species.[3]

The Seris are also aware of the limited or nonexistent parental function of the male. In at least half of the species the young, they indicated, "do not know the father." But the female parental functions have always been indicated, the suckling and the maternal care as well. On the subject of the aquatic mammals other than the sea lion there seems to be a certain amount of confusion—for here at least suckling has not been indicated or in the grey whale it has been indicated that there is not suckling by the female of the young.

Mating season was always mentioned but the informants could not always tell when mating took place. Further discussion of this subject will take place under the heading of *Seasonality*. Pairing apparently is not the mammalian feature, the Seri believe, as already indicated by their idea of the parental care. They elaborated more on the subject when discussing the sea lions, indicat-

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[3] Jaguar is said to have "many," "maybe eight"—reasons already explained.

[P 12B]

* 825 ing that mating among these beasts took place indiscriminately and "promiscuously" as we might say.

Food Habits

The Seri have a pretty good idea of the food habits of the mammals. Consistent information has been provided for all but two species, the bat and the porcupine. The 18 species for which they gave unconflicting or full information are at once divided into the carnivores and the herbivores. Indeed, all of the carnivores they mentioned as feeding on the animal diet, usually of live animals. The two exceptions are interesting. None of the three informants questioned about the porcupine could tell what the animal ate and this may well be explained by its rarity in the area. As for the bat, the responses were altogether conflicting. Some informants thought it fed on the fruit of the *pithaya* cactus, others that it fed on the insects taken on the wing. As shall be seen later, elements of the folklore enter into the Seri knowledge of the bats and the conflicting reports may well be part of the mythology.

Among the carnivores, gradation can be established from Seri responses. The larger forms prey on larger animals, the smaller forms on the smaller. Cougar and jaguar will eat the whole range of animals but at the apex of their diet there will be a bighorn and a mule deer coming down in size to rabbit, ending with the desert tortoise which apparently seems favored by both big cats. Both also, the Seri think, will take on the peccary, although here the informants' reports were conflicting; some said these cats will attack the wild pig, some said they wouldn't "because it is too fierce and they are afraid." But below the size of the turtle the cats apparently will eat nothing. The informants invariably denied that they would take a frog, a lizard or a snake.

Scaling down in size, the smaller carnivores, the coyote, the badger and the fox, will eat smaller animals. The Indians think that these will eat all sorts of prey of smaller size, usually ranging from jackrabbit to lizard. The coyote tops the list and on occasion makes off with an adult badger. It is interesting that the coyote, the Seri say, scavenges the beaches eating up shore animals, catching fish, crabs and the like. Both the coyote and the fox are said to feed also on carrion, the carcasses of deer or burros they find in the desert.

All four species of marine mammals for which the information has been obtained, the dolphin killer whale, grey whale and the sea lion, are described as fish feeders without any particular preference as to the size. In connection with this there is also an interesting note given, to me by José Juan Moreno. It concerns the killer whale and if true shows that the Seris may have had an opportunity to observe one of the peculiar habits of this animal — attacking and killing larger whales. He said that "19 years ago when a small boy, I observed a pack of these animals (killer whales?), 40 or 50 of them perhaps, attacking and killing a large whale." Such events are in-

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*825 frequent, especially in the Gulf of California where the killer whales are not too common, but José Juan Moreno may have witnessed one of those rare occurances.

The herbivores are uniformly described as feeding on the plants, a variety of cacti, palo fierro, cholla, pasture and so forth, and also on occasion seeds (on which they say the kangaroo rat feeds). There is never any deviation in the Seri knowledge from this idea, as far as I can tell. It is interesting that this category of exclusively herbivorous animals does include the peccary although the *javalin* is well known for its interest in the flesh of small animals such as snakes, lizards or any other that it can capture.

Few animals are considered free from predation—except by men, of course. Five head this list: the cougar, the jaguar, the skunk, the coyote and the dolphin, the first two, the Seris say, owing to the great size and strength, the skunk owing to its stench, while the last owing to great speed, and for the coyote also owing great wariness. The skunk, the Indians say, can effectively defend itself "because it can shoot the stench for 150-200 meters"[4] but they do not know where this shooting comes from. Also the peccary is relatively free from enemies, except the big cats. It has a fierce and nasty temper. This is also attributed to the badger who can supposedly hold his own against larger animals, even the coyote.

On the other hand, the herbivores are subject to constant attacks, the smaller they are the more enemies they have. The deer and the bighorn are taken, according to the Seris, only by the big cats and by the coyote when young. The young of these two species are supposedly taken also by an eagle, about whose size the Seris exaggerate immensely, and very young deer they think may be occasionally killed by the raven. But the smaller herbivores have a great many enemies. Both lagomorphs add hawks, crows and owls to the list, and, when young, also vipers. The kangaroo rat is subject to predation from every imaginable creature including larger snakes, sidewinders and smaller birds of prey but, significantly, is free from the attacks of larger mammals "because it is too small to see."

Finally, there is one more interesting point with the Seris' ideas of the mammalian food habits. Not one, they think, is poisonous to other beasts.

DISTRIBUTION

a) Geographical

The enclosed chart[1] shows the distribution of the mammals in the Seri environment as conceived by the Seris. On the whole, they have quite good knowledge of the geographical distribution of the mammals. The reliability of their knowledge is, of course, relative to their familiarity with the particular localities and the frequency of their visits to them. It must also be remembered that the rarity and abundance of animals are also impor-

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[4] This is a gross exaggeration. Dr. Orr tells me that the maximum accurate distance for the skunk missile is 20 feet.

[P. 13 B]

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[1] [see category 116, p61 - Analyst.]

* 825 tant factors in their knowledge. At the one pole we have the kangaroo rat, an animal so abundant that it has been indicated for all 23 localities; at the other extreme is the jaguarundi, as already indicated, little known to them, for which no distributional data is available.

The chart shows at once that the informants thought certain animals completely absent from the islands in the Gulf. Thus the cougar, bighorn, deer, badger and cottontail were indicated as absent in the islands. This indeed is the case with most of these certainly, with the possible exception of the cottontail. Its presence or absence in the islands should be verified, especially in that the informants mention the jackrabbit as present in all three of the Tiburon localities although absent from the remaining islands. A number of other animals had been indicated as being absent from Tiburon. Here belong the peccary, porcupine and the sea lion. In the latter case, what the Seris must have in mind is the absence of the rookeries and "permanent settlements" of the sea lions. Individual specimens undoubtedly do show up on the Tiburon coast.

In several instances, the Seris indicated reasons for the presence or absence of a given animal in a locality, usually in the form of comments concerning the ecological features and preferences of the species. In several cases, it may be seen at once how the particular locality is related to the essential habitat features. The cougar and the bighorn are both found in the mountainous, craggy areas, hence the Seris cited Desemboque mountains and Buena Vista for the cougar, and the "big mountains" near Porto Kino, Punto Tepopa and Desemboque mountains for the bighorn. And likewise, all of the localities indicated for the sea lion are those that have rocky beaches.[5]

Local preferences within the sea were indicated also for all three of the marine *Cetacea*. This took the form of a blanket statement that they prefer deeper waters and for the grey whale also preference for more distant waters of the area, those surrounding the islands of San Lorenzo and Angel de la Guarda.

b) Seasonal

Although the mammals are less subject to the seasonal restrictions than other animals, the Seris have observed certain seasonality, at least for some of the species. Information is available for 12 species of mammals and in that number for six no differences in the seasonal occurance are known to the Seris, while preference for the cold or hot season has been indicated for three species each. Preference for the cold or hot season has been usually connected with the migratory habits. This has been indicated especially for the killer

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[5] The coyotes, the informants thought, were more numerous on Tiburon and especially at Tecomate than on the mainland. This may be owing to the fact that these animals are intensively hunted by the Mexicans and the Americans on the mainland and near Desemboque because of the danger they represent to the domestic stock. As for Tecomate—there is a long standing Seri encampment there and a water hole—which two factors may attract the coyotes.

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[312]

[P.14A]

* 825 whale and the bat, both of which are said to be about more during the hot season. The killer whale, in fact, is supposed to be absent altogether during the cold season. On the other hand, the peccary and the bighorn are said to be more common during the cold season and the big sheep, the Indians say, "goes into the mountains of Eastern Sonora during the hot season."

For a few species, seasonal differences cannot be included in this type of analysis. The grey whale, the informants said, "comes here (to Desemboque) and Tiburon in May and disappears into the Gulf in late June." As for the porcupine, the sightings of these animals were few and the informants actually made a point of explaining that the beasts had been seen so few times that they couldn't tell in which season it is more common. José Juan Moreno summarized the situation best when he told me that "I have seen one two years ago near Kino in November. And before I saw it near Desemboque in March and before yet, a very long time ago near Tepopa in March."

So much for the gross seasonal occurances.

There are a few additional observations which indicate recognition of the seasonal differences in behaviour, although the observations here are sporadic and very few. Questioned about the time of the year when the mating of the mammals took [124] place, the overwhelming responses were "quien sabe?" In fact, only for two species, the sea lion and the deer, the Indians indicated this sort of information. Of the sea lion, the informants said "it gathers for mating in October. Everyone mates with everyone," but they gave no indication as to the time of birth of the young. More information they had about the deer where not only the mating season has been indicated but also a number of other phases of the life history of this ungulate, intimately connected with the season. Here they gave a whole sequence of events as follows: "Mating takes place in August. Young are born in May following this. In November the males fight. They (the males) drop horns in February or March, grow them in May."

The only other reference to the seasonality the informants gave was for the jackrabbit. Here, the young, they say, are born in May. Thus in the two only instances where the birth of the young has been indicated, this takes place during the summer. It is likely that if more information is available it'll tend in that direction.

It will be seen also that the two other species for which the Seri indicated a connection between the season and the life history were large species: the deer and the sea lion. It will also be seen that the animal about which they seem to know most is actually one that is perhaps of greatest economic importance and which is also common. Bighorn runs perhaps second in this respect, but it occurs only in certain limited areas and is far more elusive.

Finally, there is very little recognition of the seasonal changes in colorations in the mammals. In fact, not a single instance of such changes has been suggested to me. The replies varied from denials to the traditional "quien sabe?"[4]

[P.14B]

Migrations

* 825

Here some suggestions of knowledge of the migrations of mammals turned up. There are many degrees of this, from periodical complete disappearance (killer whale and grey whale) to local migrations such as has been indicated for the bighorn.

All told, some form of migration has been indicated for half a dozen species: the bat, peccary, bighorn and all of the Cetaceans. Also some informants thought that "the coyote moves around in the summer more than in winter" although without any indication of the mass changes of the locality or greater frequency of appearance.

Daily Rhythm

In general the Seris' ideas of this subject correspond very closely to the actual situation in nature. As a rule, they'll accurately describe mammals as either diurnal or nocturnal or both, for the majority of the mammals, from the list, are equally active both in day-time and at night. Out of 16 species reported only two (peccary and badger) are described as entirely diurnal, four (ringtail cat, skunk, kangaroo rat and bat) as entirely nocturnal while the majority are active both during the day and during the night. The coyote is said to be especially active late at night.

What is much more striking to the Seri is the slow-down of the mammalian activity at midday. In almost all cases, and, in fact, in all of the terrestrial animals this, they think, is the case. This clear cut idea covering all of the mammals is surely related to the actual situation in nature and also to the peculiar desert environment. The Seri think that most of the mammals seek refuge from the heat of the sun sleeping in the shade, except for some of the burrowing forms such as the rabbit or the cottontail which sit out the heat of the day in their burrows. Another form of adaptation to the heat is, the Seri say, the bath that the coyotes take on especially hot days.

Habitat

Mammals are relatively little restricted to a particular kind of environment. This is even more true of the desert, perhaps, than of any other kind of environment. And, as expected, the Seri on the whole make little distinction in this field. I have been able to extract only incidental bits of information indicating their knowledge of the ecological preferences. For the purely aquatic forms, such few preferences as had been mentioned have already been discussed earlier. Here included are such matters as grey whale's preference for the deeper waters in the "channel" in the Gulf and the dolphin's predilection for the off-shore waters during the hot season and the deeper waters during the cold season.

For the terrestrial or semi-terrestrial animals, information is also scanty, so much so that it is worthwhile to list all these cases. Accordingly, the sea lion is always found in places where there

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[a] Additional seasonal variant: the dolphin supposedly comes nearer shores during the hot season but stays out in deeper waters in the colder season. Its young are said to be born in March.

[P 15A]

* 825 are rocks but never on sand, and this, of course, explains its absence or presence in various localities as the Indians were prompt to point out. The kangaroo rat is said to live in the desert, sand or rock, but is never found on the sea beach —the later statement is particularly true. Coyote is supposed to be especially fond of the marine beaches where the Seris asserted "it eats dead marine animals and live crabs, or even catches fish if he can." Finally, the favorite resting place of the bats are said to be "caves" (cave shelter) and cracks in rocks but "not human houses." In fact, the informants denied that the bats ever lived in the human habitations. While this is surely true of their own houses it is not so when it comes to the Mexican habitations. I had numerous bats living under the roof of my own household. The probable explanation for this will be taken up later on.

In any event, there are only a few cases showing ecological preferences of the mammals and except for the obvious distinctions between the terrestrial and the marine animals—they do not form any particular pattern, at least from the available data.

Toxic Animals

The only mammal which some of the Seri consider toxic is the bat. But even here the ideas of the informants are conflicting.

The differences seem largely between the older and the younger informants. Miguel Barnett believes that the bat is venomous, that the venom is located in the tongue and that it can be also dangerous by spitting the venom out, which saliva having landed on the flesh may cause disintegration of it. He also thinks that there is no cure for this bat affliction. Not so with the younger informants who thought that bats could bite all right with their teeth when captured but otherwise were perfectly harmless. It may be also added that the only other mammal considered on certain occasions as toxic by the Seri is the coyote—when rabid. Here again they have no cure but they do know that a cure for the rabies can be obtained in the Hermosillo hospital. [177]

The belief concerning supposed toxicity of the bat seems to be associated with the older Seri concepts, so to speak. The younger men, those who know how to read and write Spanish and who had been around, are apt to disregard the idea. But even so, the belief in the toxicity of the bat is one of the few such notions held about the animals without any supporting evidence from nature.

Miscellaneous Attitudes Toward Mammals

The Seri have, in general, very little fear of mammals. Such as they do have concerns mostly large animals which can become dangerous under certain circumstances. Both the cougar and jaguar are considered dangerous to men and quite capable of killing them. But they are not apt to attack unless in defense of the young. Also the coyote, the badger, sea lion, as well as the bat, are considered dangerous owing to the bite they can inflict. The badger is especially combative,

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*825 the Seri think, but the captive badger held for a
week certainly did not fit this description. Finally,
the peccary is held in great respect by the Seris
owing to its combativness, nastiness and aggres-
siveness while in the pack. For this reason pec-
[224] cary hunting is done only by the adults, the Seris
said.

Other than this and with the exception of the bat, the Seri do not particularly fear mammals. Their attitudes may be best described as being very much matter of fact and pragmatic.

The situation is slightly different with the bat.
[177] The older ones surround it with a great deal of
folklore, possibly related to or originated from

[P. 16A]

*825 [177] the Mexican, since it includes such well known European beliefs as making deliberate efforts to get itself trapped in the hair and biting with the tongue. The younger ones discarded these ideas. But the residue of them or, at any rate, an afterfeeling remains. The bats are somehow regarded with disgust. It is this attitude which may well account for their denials that it lives in the human homes and it may represent a conscious or unconscious effort to cover up a disreputable fact (to them). [124] There had been some other occasions where the informants denied, for example, eating certain animals or else the knowledge of certain matters which were both later exposed by the sequence of events.

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IV

BIRDS

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Scientific	Common Name
Pelecanus erythrorhynchos	White pelican
Pelecanus occidentalis	Brown pelican
Phalacrocorax	Cormorant
Fregata magnificens	Frigate bird Man-O'War Bird
Casmerodius albus *Leucophoyx thula*	American egret or Snowy egret
Botaurus lentiginosus	American bittern
Plegadis chihi	White-faced ibis
?	Duck, species?
Cathartes aura	Turkey vulture
Coragyps atratus	Black vulture
Aquila chrysaetos	Golden eagle
Haliaetus leucocephalus	Bald eagle
Pandion haliaetus	Osprey
Odontophorinae	Quail
Numenius sp.	Curlew
Scolopacidae	Sandpiper
Catoptrophorus semipalmatus	Willet
Larus occidentalis	Western gull
Larus heermanni	Heermann gull
Columbidae	Dove
Geococcyx californianus	Roadrunner
Tyto alba	Barn owl
Trochilidae	Hummingbird
Centurus uropygialis	Gila woodpecker most likely
Hirundinae	Swallow
Corvus corax	Raven

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128
Identifications had been mine from sightings and from Blake's *Birds of Mexico* and a few other field manuals and then were checked by Dr. R. T. Orr. In many cases, especially where sightings were from geat distances or actual specimens were not available, the exact identification is uncertain and this fact should be indicated here. In several instances here are several possibilities and these are as follows:

Cormorant—Here there are three possibilities according to Dr. Orr:
1. Double crested cormorant (*Ph. auritus albociliatus*)
2. Mexican cormorant (*Ph. Olivaceus mexicanus*)
3. Pelagic cormorant (*Ph. Pelagicus resplendens*)

Egret—Two possibilities:
1. American egret (*Casmerodius albus*)
2. Snowy egret (*Leucophox thula*)

Duck—Identification impossible since no specimens were seen. It is supposedly black in color. Undoubtedly it is a duck, but which sp?

Eagle—Probably either Golden eagle or the Bald eagle. The size militates against any other bird of prey.

Quail—No identification beyond the family possible

Curlew—Dr. Orr suggests that it is either the Long Billed Curlew (*Numenius americanus sp?*) or Hudsonian Curlew (*N. hudsonicus*)

Sand-piper—One of many possible species in the area

Sea-gull—Most gulls I have seen are Heermann gulls (*Larus heermanni*) but some were the Western gull (*L. occidentalis*). These are the two common summer species. But there are also others and, according to Dr. Orr, also there are several others wintering in the region. So, Seris' generalized comments on the seagulls may well apply to several species.

Dove—Seri information applies to several species common in the area.

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IV

BIRDS

136 **Woodpecker**—There are several species in the area but Gila woodpecker (*Centrurus uropygialis*) 128 is certainly one of them.

Hummingbird—Unspecified species, one of several occuring in the area according to Dr. Orr.

Economic Uses

262 Such use as had been made of the birds is largely in the form of an addition to the diet. Reading McGee, one gets the impression that the importance of the birds in the Seri diet, in contrast to the marine animals of all description, has declined greatly. We do know that in the past various birds and, most especially, the seagulls and the pelicans represented a significant item. But today out of the basic list of 24 species, only six has been reported as eaten and all, with an exception of the duck, in the past tense. The duck *[825] evidently is the only bird which the Seri consider really fit to eat and yet, even here, there is temporary avoidance. Moreno told me that this bird "we eat only when we visit the island (Isla Patos). [223] But we do not eat it in September because it is too lean. We like it in December when it is fat. We [252] then kill it at night with stones. It is roasted."[7]

All other birds were reported as eaten only in the past and this has been expressed more or less as follows: sea-gull eaten a few years ago, cormorant 8-10 years ago, pelicans 30-35 years ago. This would mean that the pelicans had been discarded as food, at least according to the official Seri version, in the early twenties, before Kroe- 183 ber's visit. But the Seri disclaimers on the subject of the bird diet are not entirely correct and re- 262 flect less the total rejection and more only low esteem in which these birds are held. For I have seen myself the sea-gull and the pelican eaten on [261] few occasions when times were tough, and the food supply was non-existent, owing to the choppy *[825] and windy seas. The Seris caught in the act of cooking the meagre flesh of the pelican or the sea-gull were obviously apologetic.

262 It is interesting that some of the birds present in the area, the quail or the woodpeckers, are not eaten although these birds figure prominently in the diet of some of the other groups. It may well be that the Seris consider them too small to bother.

[152] As far as I could find out, eggs of only two species of birds, the sea-gull and the heron, are collected, boiled and eaten. But the eggs of the

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[7] His statement requires some explanation. There is no taboo on eating duck but the bird does not occur in Desemboque or any other place known to the Seris, with [136] the exception of Isla Patos. Here these birds winter, arriving in September and arrive worn out and lean, to *[825] recoup the fat, a few months later. The Seri unfamiliarity with their eggs is another indication that the birds come to Isla Patos only for the winter.

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262 pelicans are not; they are regarded as "bad
food," unfit for eating. No further explanation has
been offered here and it might be that the same
sort of prejudice works here as in the case of the
adult birds. Otherwise, reasons for rejecting eggs
for food are probably a matter of mere customary
attitude without any particular rationalization.
In a few instances, the dove being one example,
the eggs were said to have been rejected because
they were "too small to bother."

237 Other economic uses made of the birds are ex-
tremely few. At one time, the pelican skins were
291 used for clothing and, in fact, in McGee's time
they represented, perhaps, the most important
item of clothing for the Seris, having been worn
in shape of wrap-around robes, usually covering
the lower part of the body. Moreno reported these
robes as still in use "30 years ago or more," in
the early twenties, but in Kroeber's time these
[177] robes were already discarded in favor of the Euro-
pean garment. The Seri, nevertheless, still pre-
serve skins of these birds—the white pelican,
[439] larger of the two, always had been favored here—
and occasionally sell them to the visitors. Another
237 use made of the feather is in the arrows. The
cormorants, heron and the owls had been especi-
411 ally mentioned in this connection. But it is certain
that they were not the only birds so exploited and
also that this particular use went out of business
along with the disappearance of the bow and
arrow as the principal weapons. The use of feather
for arrows may well continue into the present in
a somewhat degraded form. The Seri boys play a
[857] great deal with bows and arrows, shooting them
at any moving available target. They'll pick up
any available feathers.

Pets

231 Somewhat desultory use is made of birds as
pets. During my visit I have seen doves and an
egret kept in houses as pets by the adults and fed
quite frequently. The number and variety of birds
/ which may become pets in households may well
* 825 be larger. Pelicans and sea-gulls are less fortun-
ate. They are often shot at and over-powered by
857 the boys. But instead of taking them to the house-
holds, the boys stage games, shooting them at
point blank from bows and arrows and pea-shoot-
ers. These somewhat bloody executions take place
almost every day. The pattern is the same. Only
the subject of the game changes, depending on
the available species of bird or animal.

Hunting

It is hard to speak of hunting in connection with
223 birds, because there is so little effort made to go
out and get them. The main exception is the duck
and this, as I already mentioned, is hunted on
Isla Patos and clobbered at night with sticks and
stones in great numbers. This is one of the few
instances in which the Seris will go out of their
way to get a bird. Sea-gulls and cormorants and,
more rarely, pelicans are dispatched by pea-
shooter (stone), sticks, small clubs and, on occa-
[411] sion, with a shot from a .22 caliber rifle.

[P.18A]

Taxonomy

*925 There is no question in the Seri mind as to what makes a bird. Feather and wings and ability to fly are their main criteria. As pointed out before, a certain amount of confusion arose over the bat, but even here, presence of fur has been considered by some of the Indians as an indication that the animal is not quite a bird, while by some of the others, that it is surely a mammal. Egg laying is also an indication of membership in the Aves if other requirements are also fullfilled. It appears, however, that the Seris show less tendency to group together various birds than they do to group various mammals.

Sexing

Not much can be said about the Seris' ability to distinguish sexes in birds. The tendency was to make no disinctions. Moreno and Montanyo, for example, specifically indicated that in all birds sexes are alike in size and color, but other informants specified that this was the case in 10 species, namely white pelican, brown pelican, egret, duck, turkey vulture, osprey, seagull, barn owl, humming-bird, and raven. For the rest, they simply provided no information or simply said "I don't know."

In general, this is certainly true. In most birds the sexes are so much alike that a professional ornithologist cannot tell them apart without disections. But in a few species there are observable differences. In the birds of prey, the females are usually quite larger, and in the humming-bird, sexual dimorphism in color is considerable, the males being much brighter. But none of these latter birds are of any importance in the Seri economy, hence no great surprise that they ignore sex differences in the few birds in favor of the generally held concept of similarity of the sexes.

Age

The Seri, judging from the available data, have no idea at all about the probable age of birds.

Size and Weight

The size of the birds, the informants estimated quite correctly with only one exception. They know little about the eagle which they hardly ever see. What they know is hearsay, on their own admission. All they could say was that "it is much larger than any bird and could lift a man or a burro." This idea, of course, does not require commentary.

With estimates of the weight of birds, it is another matter. The Seris are pretty handy with such things from their continuous experience with weighing fish and marine turtles. But here, dealing with birds, they largely follow the rule of size. The larger the bird, the heavier it is supposed to be. This, of course, does not always follow. Hence, they estimated the weight of the white pelican at eight kg. which is a gross exaggeration. The pelican, as a matter of fact, is an extraordinarily light bird.

For interspecific differences in some instances, they suggested different sizes between closely re-

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*825 lated species; white pelican outright they describe as quite larger than the brown pelican and the turkey vulture slightly larger than the black vulture.

Development and Nesting

It is obvious from the outset that the Seri knowledge of the development of birds lags considerably behind this same phase of biology of the mammals. For the majority of birds about which they had been questioned, they were unable to provide any information at all. Only for 11 species they gave evidence of detailed knowledge of this subject. These are:

White pelican
Brown pelican
Cormorant
Egret
Sea-gull
Osprey
Dove
Barn owl
Humming-bird
Woodpecker
Raven

Reasons for this difference may well be the fact that the birds' nesting habits make them more elusive than the mammals are. The birds are smaller and they are economically unimportant. The inclusion in the above listed group of all of the even remotely important economic species is quite suggestive.

Nesting

Nesting information has been provided for all of the 11 species from the above list. In contrast to the totally negative responses for each of the remaining 23 species, the information the Seris have is quite detailed. Unquestionably, this data is based on the actual observation; the nests are described in detail as to size and shape and location and even such matters as "careless arrangement of sticks" are noted. The location of the habitat of the nest and the habitat itself are frequently observed. Woodpeckers' nests, the informants pointed out, are found "only in the holes in the sahuaro" and one of them explained that this is the reason why the nests are not found along the shores of Infernillo. The cacti are absent there. Both the barn owl and the raven are credited with the choice of "caves in the mountains" for their nesting, and the Seri pointed out that "the barn owl does not inhabit the sahuaro holes like the woodpecker." In many instances, it had been pointed out that the bird nests only in certain places. Although I tried to indicate this in the chart of the bird distribution, it is worthwhile to go over their replies in detail because several show a great deal of observational acuity which confirms remarkably well to the actual situation.

Thus both pelicans are said to have "nests on rocks near the beach." The brown pelican apparently is getting rarer or his nesting grounds are disturbed. The informants denied its nesting grounds in several locations at Desemboque, including the suggestion that this is often owing to the lack of rock. "At present," they say, "this pelican nests only on Isla Raza but formerly has been also found on Patos." The cormorant likewise has no nest in the vicinity of Desemboque and is limited to the coast of Baja, California, and Angel de la Guarda. The egret, the informants observed

*825 unmistakenly, nests in the mangroves of the Estero Sargente. Finally, the seagull is supposed to nest only on San Esteban, Isla Raza and Isla Patos which is not surprising when we consider the Seris' interest in the sea-gull eggs and the relentless persecution to which the adults are subjected.

Eggs

Along with some knowledge of the nesting habits, the Seris seem to have fairly detailed knowl- [857] edge of the birds' eggs. Undoubtedly the prowling habits of the Seri boys help the matter. In any case, they were able to give a fairly detailed account of the number of eggs laid by each of the 11 species discussed above and of the size and color of the eggs. The number varied from species to species, from four (raven, hummingbird) to 8-9 (pelicans). On the whole, the size given increased with the size of the bird, as one might expect, but not always proportionately. This suggests another evidence for actual observation of these matters. The humming-bird egg has been described as unusually large in proportion to the size of an adult bird which is quite so.

The time of the deposition of the eggs has been usually indicated as March or April. A nondescript comment "in hot season" has been given for the cormorant, but evidently less is known about this bird and it is said to nest, as already pointed out, on the distant coast of Baja California. The only exception to the rule seems to be the barn owl. Here November has been indicated for the egg laying activity.

Development of the Young

Not much information concerning the nestlings has been obtained and such as there is concerns the time of their emergence. The standard idea on the subject seems to be roughly this: the young emerge one month, more or less, after the eggs are laid, and fly out of the nest a month later yet. Thus the time of emergence has been given in almost always either April or May, and the time of departure in May or June. The only exception is the barn owl where these three events, the Seris think, take place in November, December and January respectively.

From this it is plain that the Seris once more actually observed these matters and that according to them, almost all birds reproduce in the spring after the passing of the cold season but before the onset of the intolerable heat of the Gulf region.

Feeding Habits

Information concerning food habits of the birds is available for all but nine of the species listed in this section. With the sole exception of the humming-bird, dove and the woodpecker, all of the remaining 12 species are considered carnivorous, either predatory or carrion feeders or both. This is not surprising; the shore or marine birds are the most conspicuous and noticeable components of the bird fauna of the region. A majority of the species are said to be fish feeders, although some, like

[P. 19 B]

*825 the sea-gull, the informants thought (and correctly), feed on both live and dead fish. The non-marine carnivorous birds, such as the barn owl or the raven, the Seri say, feed on a variety of the terrestrial animals, ranging from lizards, snakes and small rodents to cotton-tails. The eagle is credited with the predation on the burros, although this, unlike the previous cases, is based entirely on hearsay. Of the scavengers, both vultures are said to belong to this category and also, on occasion, the raven and the sea-gull.

The only three herbivorous birds in the list, the Seris thought, were the dove, the humming-bird and the wookpecker. Both the woodpecker and the dove are supposed to feed on the seeds of the pithaya, while the humming-bird feeds on the syrup from flowers.

All these observations show considerable degree of acuity and, in fact, are quite correct, with the exception of the woodpecker. It is interesting that for the nine species for which no data is available, the informants didn't even make an effort to guess what their food might be.

In trying to explain the feeding habits of birds, on occasion the informants would indicate reasons for avoidances; in such cases, size of the would-be prey was usually the factor. This, for example, has been said of the osprey. This bird, they say, feeds on "sierra, lissa, corvina and sardinera, but not on the baya which is too large to lift."

The Seri do not believe that birds are subject to much predation from either each other or other animals. Questioned about this, they usually replied that they didn't know the answer and in the only instance where some indication of predation has been made, it concerned the cormorant which they somewhat feebly suggested "may be preyed on by the coyote." The suggestion I shall make should be taken only as far as it applies to the material on hand. Unfortunately I have no data on the birds of prey other than the fish-eating osprey, the scavenging vultures, the small barn owl and the little known eagle. It might be that some predation on birds would have been indicated if I had data on any of the fairly numerous hawks. On the other hand, in no case has it been indicated that *gavilanes* were enemies of any of the birds for which I have information. The likelihood is that, the Seri think, flight is good protection for most birds whether they so indicated or not.

DISTRIBUTION

a) Geographical

Seri knowledge of the bird distribution rests to a great extent on their familiarity with the various regional localities, plus the frequency of their visits to them. With this in mind, it is possible to analyze a good deal of their knowledge.

It will be seen at once from the appended chart[1] that only three species of birds, both vultures and the sea-gull, they believe to be ubiquitous and found in all of the 23 localities. In fact, in all these instances the informants thought that "the bird is

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[1] [See category 116 - pp 61-62. - Analyst.]

* 825 found everywhere." All three of these had been seen in the coastal as well as the inland localities, which undoubtedly is true. Of the remainder, the most widespread and common apparently are the brown pelican and the cormorant which occur in all of the coastal localities but in none of the inland localities. Next in line are the osprey, the dove and the raven, which are found in a majority of the localities. But here, as in the preceding case, absence from a particular locality is associated with the ecological and geographical features, whether or not this has been always specified by the informants.

At the other end of the spectrum are the localized birds, much restricted in their distribution. Thus ducks are said to be found only on Isla Patos, over winter, the ibis in Estero Sargente and somewhat dubiously at Porto Kino. Of the tow pelicans, the brown, a smaller one, is omnipresent while the larger white is supposed to be found only at Tassne, Kino and Estero Sargente.

In some cases the informants indicated that birds nested only in certain localities. Both pelicans are said to nest only on Isla Tassne while the sea-gull only on the islands, Raza, Patos and San Esteban.

b) Seasonal Distribution and Migration

The data on adult birds' seasonality is very incomplete and available for only 12 species; of these nine, the Seri say, are equally commonly found in both the hot and the cold season; and three are supposed to be present only during the cold season. The three latter are the duck, the black vulture and the white pelican. In all cases it had been indicated when they come in and when they move out and this can be tabulated below:

Species	month of arrival	month of departure
white pelican	October	March
duck	September	March
black vulture	October	May

At least this meagre evidence suggests that the Seri associate the cold season with the presence of certain birds and the onset of the warm season with their departure. The direction of migrations for the duck and the turkey vulture has not been indicated but the white pelican is said to go south in October and north in March. The only other bird mentioned in conjunction with the migrations was the swallow which is said to "pass through Desemboque in great number in May. But where they go?" This then is a total Seri knowledge of the bird migrations, at least as applied to the present data and it certainly isn't much.

The birds which defintely had been indicated as the area's permanent residents are cormorant, osprey, barn owl, egret, brown pelican, woodpicker, humming-bird, dove and sea-gull.

So much for the adult birds. More seasonality has been indicated for the various developmental stages as already indicated. And here all of these evidently take place overwhelmingly with the onset of the hot season, in the Seri view at least, which, of course, does parallel the actual development in nature.

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Daily Rhythm

*825 Here again data are most fragmentary and available only for seven species. But what information the Seris gave overwhelmingly suggests good orientation in such matters. Six of the species were correctly described as diurnal and only one, the barn owl, as nocturnal. This is with a qualification for the brown pelican. Of it Moreno, who [115] provided the bulk of the ornithological information, said "it flies and feeds in daytime, but when it is hungry and when food is short it'll then feed at night as well."

Moreno's explanation is somewhat difficult to understand. How does he know that the pelican is hungrier at certain times than at others? But it is true that the brown pelicans occasionally float and fish at night.

But one must consider the limitations of the data. Out of numerous species of owls present in the region, we have information only for one. Nor is there any for the nightjars.

The usual explanation for the birds' inactivity at night is sleep. In few instances the place of rest has been specified. Accordingly, the dove sleeps on trees and the duck ashore.

Habitat Ecology

Some of birds' preferences for particular spots have already been indicated in discussing the nesting habits.

Habitat preferences had been indicated for the vast majority of the species under discussion, in connection with various activities. Almost all shore or marine birds were thus indicated. This knowledge included the curlew and the willet and the sand-piper, all of which were described as "walking along the shore," although nothing else had been said about them. The bittern, the ibis and the egret on the other hand, the Seris think, have a distinct liking for muddy locations and the mangroves—all of which the informants pointedly explained. This is why, they said, they favored [137] Estero Sargente, an area of evil smelling muddy mangroves where they find food and nesting grounds

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*825 grounds. On the other hand, sometimes absence of a bird, the ibis for example, from Desemboque has been explained by lack of suitable mud.

Another sort of explanation for the presence or absence of a bird in a locality has been the presence or absence of fresh water. This was true of the dove which is said to be found near fresh water (for example in the Desemboque arroyo) which it drinks. This observation is not entirely amiss. Regardless of how far from fresh water the dove will nest, it does like to congregate near it. Still another explanation has been offered for the woodpecker and the humming-bird and the osprey. The humming-bird, they say, is rare where there are no trees. (This in view of its nesting habits and its feeding habits is not surprising.) The woodpecker, they think, must have a sahuaro to live in (quite correct) and this is why it is absent from the region of Infernillo where there are no sahuaros. The osprey, they say, also likes to live more in areas where there are sahuaros because it nests on the dry ones.

Parental Function

Here such meagre data as are available show that according to the informants rearing of the young among the birds is entirely the female's preoccupation and that the male has nothing to do with it. They repeatedly emphasized that "young do not know the father" or that "they are fed only by the mother." This hardly reflects the
*825 situation in nature, at least for a great many
562 birds and especially for the song birds. But there
is in the Seris, evidently, a streak of belief in the
182 uselessness and uncooperativeness of the male in
such matters. This belief is met up with time and again in many groups of animals, and probably represents a conventional attitude, not tempered by observational evidence.

Dangerous Birds

*825 With the exception of the eagle, no bird is considered dangerous and the eagle, who is supposed to be able to lift and attack a man, earns its reputation only on hearsay.

V

REPTILES AND AMPHIBIANS

136

Scientific	Common Name
Lizards	
Phrynosoma platyrhinos goodei	Horned toad
Callisaurus draconides inusitatus	Gridiron-gailed lizard
Cryptaphytus wislizeni	Common leopard lizard
Cnemidophorus sacki	Spotted race runner
Cnemidophorus tigris aethiops	Race runner
Sauromalus obesus townsendi	Northern chuckawalla
Sauromalus varius	Chuckawalla
Dipsosaurus dorsalis sonoriensis	Northern crested lizard
Heloderma suspectum	Gila monster
Uta ornata linearis	Uta
Uta stansburiana steinegeri	Striped ground uta
Sceloporus magister	Fence lizard
Coleonyx variegatus sonoriensis	Variegated ground gecko
Xantusia vigilis	Desert night lizard
Snakes	
Crotalus cerastes cercobombus	Side winder
Crotalus atrox	Western diamondback
Micruroides euryxanthus	Coral snake
**Coluber flagellum frenatus*	Red racer
**Coluber flagellum piceus*	Black whipsnake
Salvadora hexalepis deserticola	Patch nose snake
Trimorphodon lambda	Lyre snake
Turtles	
Gopherus agassiz	Agassiz' desert tortoise
Sp?	Loggerhead
Sp?	
Amphibians	
Bufo alvarius	Desert toad

*These two are color varieties of the same species.

Reptile Identification

136 With the exception of the marine turtles, all
species had been identified from preserved specimens
128 either by myself or by Dr. R. Zweifel, Dr.
C. M. Bogert, and Mrs. Hecht from the American
Museum of Natural History, who also checked my
identifications. There is then no question of dubious
identification. But circumstantial evidence
* 825 suggests that belief in the mildness of the coral
snake bite, to themselves at least, may well be influenced
136 by the proliferation of the false coral
snakes in the area. Mrs. Hecht lists the following
of these as likely to occur in the area:

- *Lampropeltis nelsoni*
- *Lampropeltis pyromelana*
- *Rhinocheilus lecontei antoni*
- *Chionactis occipitalis organica*
- *Chionactis occipitalis palarorostris*
- *Chilomeniscus cinctus*

These snakes are very similar to the coral snakes and may well fool most observers, unless they know the differences in the color pattern. Unfortunately, I have not found any of them; there-

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V

REPTILES AND AMPHIBIANS

136 fore it was impossible to check the Seris' ability
*[825] to distinguish between these.

As for the marine turtles, there are several possible species in the area. There is no mistake about the loggerhead. I have seen one carapace and bones taken at Campo Vivora, while with the Seris. The others could be any two of the several species common in the Gulf.

Economic Uses

*825 In 1956 I published data concerning economic exploitation of the reptiles by the Seris which
114 need correction. Eleven species out of 25 had been reported as used economically. Additional work done in 1955 and after the completion of the MS. indicated a much higher percentage: 17 species out of 26 are used. Thus the percentage increases from 44% to 65%. The percentage of the species actually used will probably rise with additional [262] field work because some of the informants are disinclined to admit eating certain animals or will [124] simply say, "these had been eaten in the past but not now." However, close inspection and observation often contradict these statements.

262 The list of species reported as eaten is as follows:

Turtles and tortoises: all species
Snakes: both racers, patch nosed snake and both rattlesnakes
Lizards: both chuckawallas, Gila monster, race runner, northern crested lizard

This listing shows how much dependent are the Seris on the desert habitat for food. Even today, with all the available ready-made manufactured [178] food or imported food from the *tienda,* they gather evidently most of the common reptiles to increase their menu.

Of the species in the list, only two, both smaller species of sea turtles, figure as really important items. McGee believed that here was by far the most important part of the Seri menu, with the marine birds running second.[*] Now, the importance of the sea turtles has declined, no doubt through a variety of outside influences. I doubt (on the basis of my observation) if altogether it comes to more than 10% of their total diet. The turtles had been replaced as number one food by [177] the fish (with the introduction of hook and line fishing). But anther factor evidently is the depletion of the turtle population. The third species, the huge loggerhead, is so rare that during the entire [225] summer of 1953, only one of them had been harpooned and that at Camp Vivora away from Desemboque. The two smaller species have also become very rare and hardly ever show up near the village. They can be taken on more distant expedi-

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[*] Eggs of the turtles are considered a delicacy, especially of the smaller of the two. The Seris say that the loggerhead has been eaten once but now almost never, because it became so rare.

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262 [225] [439] tions to San Esteban or San Lorenzo. The turtles now are as much a food as a "cash crop." While the Seris are camped at Desemboque, most of the turtle catch is sold alive to the Mexican fish traders who are headquartered in Nogales and Hermosillo and take the catch along with the fishes to the markets in these towns and sometimes even as far as Phoenix and Tucson.

Of the remainder, the most frequent items that show up on the Seri table are probably the rattlesnakes and the desert tortoises. The rattlers are eaten with relish—only the heads and the tails are discarded as poisonous. The larger chuckawalla is considered a particular delicacy but is rarely caught because it lives in a somewhat distant region. The remainder of the animals listed as "eaten" are collected only incidentially.

It is probable that very few species are really left alone and not taken as food at various times, especially when famine distress overruns the camp. As far as I could determine, only three species are rejected as altogether unfit to eat: the gecko, the night lizard and the toad. All three are believed to be highly toxic "in flesh and blood" although real harm could be caused only by the toad. Besides, the two lizards are really tiny creatures and would make little difference when a survival is at stake.

*825 [439] 237 Few reptilians are ever used as anything but food. The sea turtles in a way are at certain times, that is, when they are sold for hard cash to the Mexican traders, whether live or sliced and salted. The only other creature I ever heard about as being used for anything at all was the coral snake. At least one informant suggested that in the past its hide has been used for hat decoration. But coral snakes are scarce and this again could be only incidental. It may be that the rattlesnake hide, especially of the large specimens of the western diamondback, is sold occasionally to a passing visitor but this again is a rare occurance.[8] [439]

Food Preparation

252 [263] Food preparation of the majority of animals in this group is no different than of most other animals. They are simply skinned, tossed into a pot of boiling water and cooked, occasionally with salt as the only ingredient. Larger individuals, notably turtles, will be quartered and then boiled or roasted on a grill. The chuckawalla and the desert tortoise are said to be fried, but whether this is the usual procedure I can't say, because only a few of them had been brought into camp in my presence. The tail of the Gila monster supposedly had been fried in oil "in the past."

Food Preferences and Taboos

262 It is obvious that some creatures in this group are considered better food than others. The chuckawalla is especially favored. When several were brought in from San Esteban, I couldn't persuade the owners to part with them, although I offered a huge price (for local conditions). The captors took

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[291] [8] Another use in the past—snake-skin belt worn. It is illustrated by McGee (1898:170, Fig. 7).

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262 them to their shelter and held them there for several days before they and their families finally ate them up. The turtles are also a well-liked item.

As already indicated in some instances there exists preference for a particular part of an animal. Of the Gila monster only the fat tail was said to have been eaten, and of both rattlers, the head and the tail are discarded on the grounds *[825] that they contain toxin. Finally the toad and the gecko and *Xanthusia* are all rejected as completely venomous.

178 262 It is also evident that changes in the Seri taste have occured in the course of the past several decades. Some animals are on their way out as food, and here we have the Gila monster, the whipcoach, the red racer and smaller lizards. In several cases, and this includes the Gila monster, the responses indicated that the animal had been eaten in the past. I also observed that on the sly, the Seris would eat them when other food was in short order. But they are reluctant to admit this and often altogether denied it.

Hunting

224 [225] Most reptiles are captured by hand or else killed with a stick, stone or pea-shooter. Except for the turtles, the Seris will not make special expeditions. But it is certain that if they find themselves on any of the islands near the shores of Baja California they will go ashore deliberately in search of the chuckawalla.

225 The turtles are another matter. Here now, just as in the past, special expeditions are made in order to get them. [501] These expeditions take place nowadays in the usual flat-bottomed plank boats, either motor or oar propelled. The hunt takes place only during unusually quiet and dark nights, when the Gulf is smooth and calm and there is neither wind nor ripple. With the slightest disturbance, [354] [411] turtle fishing is impossible. It is all done with the torch lights or Coleman lanterns. The principal and only weapon is the harpoon, identical with that described and illustrated by McGee. The turtles are then harpooned, dragged into the boat and either left alive, when the hunters have a sale of live ones in mind, or pounded to death with a [251] club or oar, quartered and then either consumed on the spot or else dried and salted.[10]

[224] [462] While the collecting of the smaller animals usually falls to the children or women, turtle hunting is men's job. Men, too, usually get the chuckawalla because they usually visit more distant islands.

Pets

231 None of the reptiles are pets in a real sense. Those few that might be kept are only held until the day when they are butchered and eaten. It is motivated more by the wish to preserve fresh food than by any affection for the animal. The turtles, the tortoises and the chuckawalla belong here. Occasionally a Seri boy will string a lizard, a *Scel-*

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[10] The loggerhead is hunted in the daytime because, owing to its great strength, night hunt would be too dangerous. Two harpoons are always used on it, while for the smaller species, one harpoon usually suffices.

[P.23B]

231 *oporus* or a *Cnemidophorus*, but even so, the life of the captive is short. Sooner or later it'll be slaughtered like any other beast played with by the Indian boy.

Taxonomy

*825 In general the Seri recognize the major groupings of this class. Thus we have the lizards, snakes, turtles, sea turtles and toads. All these do correspond to the natural groupings with the sole exception of the horned toad. For some reason it is not classed together with the lizards but is supposed to be an entirely different animal. Some of the informants tend to keep the "vivoras," that is the rattlers, separate from the snakes but others think they are just a different kind of snake.

In distinguishing between one species and another, the Seris showed remarkable acuity. Out of 26 species listed here, they confused only two, both relatively small and similar looking Utas.[11] On the other hand, they were able to associate correctly specimens of the different sizes and often also colors of the same species. I frequently mixed up large number of specimens without telling them anything about them and yet invariably the informants were able to sort them out correctly. 124 *825

It is also interesting that, when I showed to Barnett and Moreno a specimen of a small toad I brought along pickled from Needles, California, they both identified it with the *B. alvarious*, the local toad.

*825 Moreno also told me that there are two species of *Dipsosaurus* on San Esteban and the one I had was the smaller of the two. I am unable to check this information and it may be that what he had in mind was the larger chuckawalla. I have obtained information about the chuckawalla from other informants but not from him. There are no larger lizards in the area other than the chuckawalla and the Gila monster; therefore this suspicion is justified.

Sexing

All reptiles or amphibians, according to the Seri, do have the male and the female sex and in most cases highly specific traits in the two sexes of the same species were indicated. Actually sex differentiating data had been obtained for 23 out of 26 species. The three species for which no data on this are available were spotted race runner, western diamondback and the red racer. For the first two it may be an oversight on my part in the course of questioning. As for the red racer, the answer simply was "I don't know" or "I can't tell." It is possible that other individuals could have provided a more specific answer.

In general a multitude of criteria to differentiate the sex in the animals were employed; size, color pattern, presence or absence of specific structures all were used either individually or together. For 16 species the informants indicated either differences in size or similarity in size;

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[11] Gecko and *Xanthusia* go under identical Seri name, but, they say, they are different forms. However, they do separate the two racers, black and red variety, even if taxonomists today lump them as color forms of the same species.

[P24A]

* 825 for the six remaining species no size data had been obtained but the sexes are differentiated there in other ways.

The criteria of size may be best tabulated as follow:

male larger	sexes equal	female larger
Callisaurus	Night lizard	Northern crested lizard
Race runner	Gecko	
Leopard lizard	Gila monster	Sea-turtle
Northern chuckawalla	Fence lizard	Side-winder
Chuckawalla	Loggerhead turtle	
Patch nose snake	Coral snake	
Desert tortoise*	Desert tortoise*	

*Conflicting reports from different informants.

It is difficult to see the generalized pattern here because in each of the above categories are representatives of the major groupings. Perhaps the only suggestion one gets is a tendency to rely on the color and pattern in distinguishing sexes in snakes, rather than the size.

When the size differences were indicated, it was usually expressed in terms of one of the sexes being larger. Sometimes, as in the case of the leopard lizard, indications of the actual differences in size were given.

The color is only one of the differences mentioned here. Yet, in nine species, the informants indicated that both sexes were alike in color:

Sea-turtle (smaller sp.)
Tortoise
Coral snake
Northern crested lizard
Fence lizard
Gila monster
Race runner
Northern chuckawalla
Chuckawalla

In few instances specific differences were indicated. The males of the black whipsnake and the *Salvadora* (patch nosed snake) are much darker than the females, the Seris say, while dark spots on the ventral side of the males are supposed to occur also in the side-winder and in the horned toad, in the latter on the femora. Information for the lyre snake is indecisive but there is a suggestion that the same sort of criterion had been employed in distinguishing sexes there. The only other color distinction the Seris make is the gridiron-tailed lizard. Here the male has blue color underneath.

All this suggests that darker coloration in the male over the entire body or of the ventral side only is, in the Seri mind, somehow associated with the snakes rather than with the lizards. The *Phrynosoma*, after all, is not a lizard to them. As for the *Callisaurus*, the presence of the blue color is so clear that it requires no explanation.

Finally, few structural differences were employed by the informants in telling the sexes apart. Presence or absence of the femoral ridges on the ventral side of the femora has been employed in dinstinguishing the sexes in eight species of reptiles, all of them lizards. These are:

Gecko
Desert night lizard
Leopard lizard
Northern crested lizard
Race runner
Northern chuckawalla
Uta (two species)

[P.24B]

*825 In the northern chuckawalla, the female is supposed to have lesser ridges than does the male but this is an exception. In all other cases, the sole possessor of this characteristic is the male. This, of course, is not so in nature, but it shows that certain structures are supposed to indicate male sex. It is also clear that this particular trait is associated with the lizards and in a way represents a kind of taxonomic character the Seri tend to associate with the male lizards.

The only other trait employed exclusively refers to the toad. Here the male is supposed to have "dos huevos," two eggs, outside, the same feature the Seris associate with the male of the mammals.

It is interesting that no structural differences were suggested for the side-winder.

Age

The age of reptiles and amphibians is really a great mystery to the Seri. Although they have given some sort of answer for 19 species in the list and for 16 they suggested definite length of life for the animal (for the other three they didn't know), no reliable replies suggesting anything else than the individual idiosyncracies of the informants could be established. The informants showed a distinct tendency to provide pat answers for all sorts of creatures. This tendency appears to be associated with the age. The younger informants usually gave brief prospective age of various species; the older ones gave longer age. Thus, Moreno, for example, usually gave hypothetical age of larger species as say 5-6 years while Chico Romero or Ramon Montanyo for the same species gave 70 or 80 years respectively. It is interesting that the two last men are close to the age indicated for the animals.

The only general tendency that could be established is a gradient of relationship between the size and longevity of the animal. The larger the beast, the longer it lives.

Seasonality to some extent enters here. Thus two of the informants said of the side-winder that "perhaps it dies with the cold season" although others thought it lived a long time. Similar suggestions had been made for a couple of species of lizards. It is clear that absence of such small creatures during the cold season must suggest to the Seri their early demise.

In one case, a definite manner of establishing age of an animal has been suggested. In the western diamondback and the side-winder, the age, the Seris think, can be established by counting the rattles on the tail. This belief is widespread [177] among the Mexicans and it may well be that it represents an increment from the influence of the Spanish-Mexican culture.

Size and Weight

Seris' ideas of the size of reptiles is remarkably accurate. Time after time they made very correct estimates of the size which the animal can reach. [804] They expressed this as a rule with a hand motion indicating the size of the animal. The accuracy is not surprising, because they see these animals

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*825 innumerable times at close quarters. The only exception was the loggerhead turtle. The size of this giant reptile had been given at the maximum as five meters and it is a gross exaggeration. But here again the factor of frequency of sightings enters into the picture. As pointed out earlier, this turtle became quite scarce in the upper part of the Gulf, so much so that it became a legend among the Seri.

Less astute are they in the estimates of the hypothetical weight of an animal and where detailed responses were given, it was almost invariably for a well-known and economically important species. In fact, I can find answers only for the marine turtles (all three), the tortoise and the chuckawalla. These five are the largest reptiles in the Seri environment. Chuckawalla's weight had been given with only slight exaggeration but, for some reason, all three species of marine turtles were subject of exaggeration and the giant loggerhead more so than the two smaller fellows. This is more surprising considering that the Seri do [439] weigh these animals while selling them to the Mexican traders.

Development

The Seri consider the majority of the reptiles oviparous. But there are exceptions. The sidewinder, the toad and the horned toad, they think, are viviparous. This, of course, is true of the sidewinder which carries well developed young before birth. But it is not of the other two. Why the numerous *Phrynosoma* should be considered viviparous is not clear. It is true that some of the species of horned toads give birth to live progeny. But the species in question happens to be oviparous. As for the toad, here the Seris say "it has no eggs and young are born alive." They must proceed from an argument that they've never seen toads' eggs, which is easy to understand. Open permanent waters are almost non-existent in their country and the toads' eggs, inconspicuous as they are, may remain unnoticed. Since no eggs were seen, the logical conclusion for them is to believe that the animal must be born alive.

Outside these four there are four other questionable species. For the Gila monster and the spotted race runner, the informants couldn't tell whether the animal came out of eggs or was born alive, and for the leopard lizard and the fence lizard, there were conflicting reports. The data suggests that the dubious cases are usually small or little known and rare lizards. The exception is the *Phrynosoma*. But *Phrynosoma* is somewhat atypical in this context. The Seris believe that it does not represent the final stage of an animal but that it does develop into some other kind of creature, though I had been unable to find out just what it was. It was also indicated that *Phrynosòma* is not a lizard but a creature of its own kind.

For the majority of species the numbers of delivered eggs had been given as 1-6 with 4-6 being the most frequent figure which actually does correspond to the natural situation. But some species are considered to be more prolific. The tor-

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* 825

toise, they say, lays eight eggs, the chuckawallas (both species) a dozen or a little more, northern crested lizard 12-20. Greatest numbers are attributed to the marine turtles. The lesser species, they say, will deposit 60-70 eggs, the loggerhead from 60-300.

Knowledge of the time of when the eggs are laid is more limited. The data are available for fewer species. The month of May has been given as the time of egg laying for both species of chuckawalla, both lesser marine turtles, the tortoise and the northern crested lizard. Sometimes also location of the egg nest has been given or the manner in which this is done. The marine turtles and the loggerhead, they say, go to the beach at night and there bury their eggs. A few other species will bury their eggs, although on the dry and high land, among them the red racer.

Only in two cases were the Seris able to indicate the time of the mating season. These were the larger chuckawalla, which they say mates in May and lays eggs in June, and the lesser marine turtles, which they say mate in June.

In connection with the development, the Seris clearly see the limited parental function in the reptilian world. Only rarely have they indicated that the adults would look after the eggs or after the progeny, and in each instance it was a female. This has been cited by the informants for the following species: chuckawalla, race runner, gridiron-tailed lizard, both species of uta and side-winder. We can see then that almost all of these are lizards. It is apparent that they arrive at this idea by observing the adult female with the freshly delivered eggs or tiny young immediately after delivery.

Food

The majority of the reptiles and amphibians, according to the answers of the informants, are carnivorous. Only seven species are described by them as herbivorous, and, of these, one, they think, also partakes of flesh. The six species described as entirely herbivorous are all of the turtles, both species of chuckawallas and the northern crested lizard. Of these, the marine turtles, the Seri say, feed on the sea weeds, while the tortoise feeds on the various sorts of desert plants. They emphatically denied that any of these ever feeds on flesh. A similar diet is ascribed to both chuckwallas. Finally, *Dipsosaurus* is supposed to feed on the foliage of Palo fierro. Actually, the diet of this lizard consists largely of insects of various sorts, and, on occasion also, of its own kind, smaller specimens or smaller lizards of other species. What may have given the Indians an idea that it is feeding on the foliage of Palo fierro is the fact that it often climbs this bush.

Confusion arises only in the case of the leopard lizard (*Callisaurus*). Some informants claimed that it feeds on other lizards, another that it does not but feeds on the fruit of certain trees, while one of the informants thought it fed on flesh and and on the fruit of the sahuaro as well. Actually,

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*825 this lizard is a well-known cannibal and smaller lizards make up a very large proportion of its diet.

But if the Seri missed on the type of diet of two species out of seven, which they ascribed to the herbivorous category, they didn't on the remainder of the animals. Here the diet is in fact entirely carnivorous and they indicated so. The sort of animals eaten was largely associated with the size of the beast. Small snakes, coral snake for example, and all of the remaining lizards and the toad were said to be insect feeders and the insects on which these fed were variously described as "insects, spiders, ants, beetles (usually referring to the darkling beetles *Eleodes*), moths, flies" and so on. The Gila monster, they said, also feeds on the beetles (*Eleodes?*). Actually, the coral snake feeds mainly on other smaller snakes and on small lizards, in the grown up stage at least. As for the larger snakes, the racers and rattlers, the informants suggested larger animals, such as large lizards, small hare, jackrabbits, mice, kangaroo rats, as well as larger insects and beetles. It is interesting to note here that the red racer is supposed to overpower the rabbits by choking them to death. This is somewhat an exaggeration because the snakes may use a "loop" of the body to hold up the prey, but it does not use the fatal squeeze.

From the above data it will be seen at once that the majority of the cold blooded vertebrates are regarded by the Seri as carniverous and that among the carnivores are all of the snakes, the toad and the majority of the lizards, while on the other side are all of the turtles and some of the lizards. Among the lizards this is in no way related to the size—the two largest, the chuckawalla and the Gila monster are herbivorous and carnivorous respectively, while the three next in size, the northern chuckawalla, the *Dipsosaurus* and *Callisaurus* are considered either as herbivores or of mixed diet, although in truth both are carnivores. It may also be seen that where the misinformation arises over them in the Seri ideas, it has a great deal to do with the arboreal habits from which they conclude that such an animal must climb trees largely in order to get the fruit of the tree.

There is a great deal of information about the Seris' conceptions of the predation on the reptiles. The most frequent predators, the informants thought, were hawks, raven and coyotes. These, in fact, were repeated as preying on the half or so of the species from the list and by far the majority of those for which data is available. Fox, cougar and coyote were also mentioned among the mortal enemies of the lizards and snakes. In the case of the lizards, other snakes and especially the vipers were frequent on the list of enemies. Eagles and domestic cats and occasionally other lizards were also mentioned although there seemed to be little knowledge of the diet of the eagle. It is interesting that the leopard lizard has been mentioned specifically as feeding on the gecko—an undoubtedly observed fact. In some instances, the animal is subject to only limited predation.

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According to the informants, the only predator on the tortoise is the cougar and it is known that cougar relishes an appetizer of a tortoise.

In some instances, the Seris indicated that this or that animal is entirely free from predation. In such cases, they usually indicated the reasons for it, without actually being directly asked about it. Thus the marine turtles are free of predation, they say, because of its size and strength. Of others, are the chuckawalla and *Dipsosaurus*, the first because it is too strong to be lifted and overpowered, the second because it lives on Palo fierro away from persecution. The lesser of the chuckawallas, they claim, is free from most enemies, even such animals as the badger, because it sticks flat under rocks and can't be dislodged. This is an interesting observation, because this lizard has a habit of inflating itself in crevices, expanding the ribs, and, indeed, it is hard to pull out of its hideout.

DISTRIBUTION

a) Seasonal

Just as clear cut as the differentiation between the daily rhythm of activity is the seasonal distribution. This is obvious from the tabulation of the comments for each species:

	No. of species
present hot season only	12
present more in hot than in cold season	7
equally in both seasons	6
more in cold than in hot season	0
cold season only	0

It is clear that none of these animals shows any perference for the cold season of the year. The overwhelming majority occurs during the hot season and this distribution is strengthened by the fact that the species indicated as occurring occasionally during the cold season were largely described as "very rare in cold season."

In line with a lizard's preference for diurnal heat, they seem, in the Seri view, more likely to show up during the hot season than do the snakes. Of the species that were mentioned as occurring in equal numbers in both seasons there are coral snake, lyre snake, both utas, northern chuckawalla and *Dipsosaurus*. Perhaps the inquiry from more informants than the four questioned on the subject of reptiles and amphibians may reveal responses disputing the lack of preference for the hot season. The seven species which the informants indicated prefer hot season to cold were patch nose snake, side-winder, black whip-snake, spotted race runner, leopard lizard and two smaller marine turtles. That leaves all the remaining 13 species in the list described as entirely summer species and among them there are eight species of lizards against two species of snakes.

These sharp differences should be no surprise to anyone who has been in the Sonoran desert both during the summer and during the cool, wintry, rainless winter. The differences in the variety and numbers of animals are immense.

Disappearance of the reptiles or amphibians for the winter is variously interpreted by the Seris. Many answers indicate real puzzlement as to the reasons for this and, on an occasion, the

* 825 informants suggested that maybe the animals die with the onset of cold. But in such cases it does not occur to them to figure out how the species may carry on from the fall to the spring. The eggs, they know, usually are laid in the spring and if the adult dies off in the fall before depositing eggs, then what? To this Seri idea we have no answer. The usual reply is often "in winter not seen."

But occasionally more specific beliefs are advanced, of which the most common is that the adult sits out the cold season underground (just as it may sit out the heat of the day or cool of the night, depending on its requirements). The toad thus "lives underground. It goes underground in October and comes out in May." It also "comes out when it rains and then it makes the noise—raurrau, rrau, rrau—the male and the female make it." [805] The cold season, to the Seri, lasts from October till May and frequently May through October has been indicated as time of occurrance of the animal. Like the toad, the tortoise and the race runner disappear underground for the duration of the cold season and there had been a few feeble suggestions from the informants that the patch nose snake does the same. As for the sea turtles, they go to deeper waters for the winter. Nothing much of this sort had been said about the loggerhead turtle, undoubtedly owing to its extreme rarity.

Sometimes the informants went beyond mere statement of the absence or presence and indicated where the animal may be absent during either of the seasons. Thus, for example, the black whipsnake is common in Desemboque during the summer but very rare during the winter.

In some instances, association between rains and sudden activity is made. The tortoise and the toad both come with the rains, they thought.

b) Geographical

The appended table[1] of the distribution of animals as seen by the Seris requires few comments. Four species had been described by the blanket statement "found everywhere" and this is indicated in the chart. But while it may well be true of the utas, very small and ubiquitous lizards, it is less likely to be true of the patch nose snake and the western diamond back. Unfortunately, the exact distribution of these reptiles in the area is little known, even in the islands of the Gulf. What basis there exists for the Seri statement is hard to tell.

On the whole, the distribution often reflects the Seris' acquaintance with this or that locality rather than peculiarities of the fauna. Hence, Desemboque, Kino and Tiburon are most frequently mentioned localities, while Punto Peñasco least, [484] and these are really localities most and least frequently visited by them. But, in other instances, there is a real reflection of the natural situation. It is known that the fauna of Isla Patos is extremely limited and also that some species, chuckawalla, for example, are found on three of the larger Gulf islands toward the coast of Baja California, but not on the Sonoran side of the Gulf

[P. 27 B]/ [1] [see category 116, p62. - Analyst.]

* 825 nor on Tiburon. The distribution on Tiburon of the toad, as suggested by the informants, indicates that it is found in the localities where there are *tenajas* or less permanent water reservoirs.

The ecological factors in the distribution of animals, as observed by the Seri, have already been discussed. But it may be added that these explain the Seris' belief in the rarity of the gecko and the night lizard. Both are actually very common in the dried-up sahuaros. But small and nocturnal, they may scarcely be noticed by the Indians.

Daily Rhythm

The Seri have a clear cut idea of which animals are nocturnal and which are diurnal. The total breakdown by species is presented below in a table:

	No. of species
active in daytime only	14
more in daytime than at night	0
equally in day and night	2
more at night than in daytime	1
at night only	8

The majority of the forms are considered diurnal. But this is not significant here. The important thing is the breakdown by groupings and here the pattern of the Seri beliefs emerges clearly: the majority of the lizard, with the sole exception of the gecko and the *Xanthusia*, are considered diurnal, which—indeed, is so, while the two just—mentioned lizards are well-known night prowlers. The majority of the snakes, on the other hand, are considered nocturnal. The exceptions here are the lyre snake and the red racer, both of which, the Seri think, are diurnal and the black whipsnake which they think is largely nocturnal, but which, they say, also will wander about on occasion in daytime. The two racers, indeed, are largely diurnal but the lyre snake is active mostly at night and early morning. It may well be that my informants have never seen this creature prowling at night. Of others, the toad, of course, is ascribed to the nocturnal group.

The turtles, on the other hand, are either creatures of daylight (tortoise) or else will be active both in day and night (sea turtles).

The lizards, on the whole, are considered creatures of the sunshine and this fact had been emphasized time and again by several of the informants for several species. Nights, they say, the lizards (majority of species as indicated by their individual responses), spend in burrows or *Dipsosaurus* also on the trees. Few, it has been indicated, tended to rest in the midday when heat is greatest—in the shade or other covered place—an indication that they well observed the slowing down of the activity during the midday heat. On this subject, of the red racer they say that it often climbs trees and bushes during that part of the day, in order "to escape hot ground," as indeed it does.

Of the hiding places of the nocturnal animals similar ideas are entertained. The large rattler spends daytime coiled in the shade of the bush. The gecko hides in dried-up trees—an altogether

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*825 accurate observation. I have collected several of them after cracking out dried-up, dead sahuaros.

Habitat

As already suggested, the Seri will indicate quite accurately the sort of habitat in which the animal lives. This has been often described as sand, rock, tree, sea-beach, underground, and of course, various sorts of waters. Furthermore, this sort of argument has been used frequently to explain either presence or absence, rarity or abundance, of an animal.

Some animals had been described as rare while others as quite common to very common.

Specifically, the Indians indicated for a considerable number animals preference for the sandy or flat country. Horned toad, gridiron tailed lizard and Gila monster, they believed, prefer sandy areas. So, evidently, does the coral snake and the patch nose snake, because, they explained, the former does not occur on San Lorenzo Island and the latter at Estero Sargente for just that reason—absence of sands. In fact, the absence of the patch nose snake from Estero Sargente area, has been explained as follows: "there is no sand there, but too much mud." While few animals are credited to the marine beaches and usually their presence there is denied, the gridiron tailed lizard actually is claimed to be common on them (and in fact it is). Another creature found on sands and playas is the spotted race runner.

Other animals, according to the Seris, prefer rocky ground: here are especially the tortoise and both species of chuckawalla—which undoubtedly is true. The lyre snake is supposed to be more frequently found in the mountains. Finally, the toad is forever found near the water, the Seris think, and this does not require any comments. As for the smaller marine turtles, their seasonal preference for the deeper (cold) or shallower (hot) waters had already been mentioned as well as the loggerhead's preference for the deeper waters at all times.

Seri knowledge of habitat preferences is not always very accurate. According to my informant the northern crested lizard likes rocky ground. Yet all those I shot or have seen were on the sands of San Francisco. The same lizard is supposed to live on the rocks on San Esteban, but this may well have been confused with another animal.

Social Life

Just as they recognize lack of parental function in the reptiles, so they do consider these animals creatures of solitude, and, with the few exceptions, they believe that they are solitary or, as they often express it, "live without family." The only exceptions are both species of rattlers, both of the lesser marine turtles and the tortoise, all of which they say are gregarious. Western diamondback, they say, live in packs of 20-25, while the side-winder lives in somewhat smaller groupes of 15-20. The marine turtles, they also

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* 825 say, travel in packs while the tortoise gathers in large numbers, sometimes as many as 100 at once. The only other creature that ever appears in more than single individuals is the toad. This one, they said, "walks in ones or twos sometimes."

It appears that the gregariousness of the rattlers actually refers to the large aggregations that show up in the early spring for the mating purposes or in the late fall for wintering. But the informants gave no indication that they ever recognized transitoriness of these gatherings.

Migrations

With the exception of the marine turtles, none of the animals in the list is in any way considered migratory. But the Seris attribute to the sea turtles a certain amount of migration. This may well be in line with their reasoning about other marine creatures which they also consider by and large migratory.

Toxic and Dangerous Animals

According to the Seri, a fair number of animals in this group are possessed of venom, although not all of them will make use of it, and some, even though toxic, will not bite. This matter may be best presented in the chart below:

Species	Venomous	Not venomous	Bites	Does not bite	Venom in body	Venom in teeth	Venom in flesh (eating)	Venomous by touch	Fatal to animals	Fatal to men in general	Fatal to Seri
Crotalus atrox	x		x		x	x			x	x	x
Crotalus cerastes	x		x		x	x			x	x	x
Micruroides	x		x		x	x			x	x	
Coluber flagellum	x[1]	x[1]	x							?	?
Masticophis	x		x			x					
Trimorhodon	x			x	x,	x					
Phrynosoma	x		x[2]	x[2]							
Callisaurus		x	x								
Crotaphytus	x		x			x			-	?	x
Sauromalus varius		x	x								
Dipsosaurus		x	x								
Heloderma		-		-							
Coelonyx	x				x		x			x	x
Xanthusia	x				x		x			x	x
Loggerhead turtle	-		x								
Marine turtle (2 sp.)			x								
Bufo alvarius	x		x[3]		x		x	x	x	x	x

[1] Conflicting, minority thinks dangerous, majority that it isn't.

[2] Conflicting, minority thinks not dangerous, majority that it is.

[3] Bites with tongue but some think it doesn't bite. But all agree that it is dangerous on touch and to eat and that it has venom.

Thus 11 species from the list are considered toxic and another seven dangerous but non-toxic. All of the latter, with the exception of the Gila monster, are said to be able to inflict a nasty and painful bite, but apart from that they don't need to be feared. The Seris respect the marine turtles for their strength, not aggression. The Gila mon-

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*825 ster is really a curious case. The Seris deny that it is venomous or that it bites. Reasons why this really venomous beast is considered harmless by the Seri is probably twofold. First, it is quite rare in their territory; the area of Kino and Desemboque is near the southern-most boundary of its distribution. Second, it is sluggish and slow moving and quite unaggressive, and, as the Seri know it, it probably never has bitten any of them within their memory.

To break them down by the groupings, the toxic species are six species of snakes, four of lizards and the toad, and the non-toxic, all of the turtles, 10 species of lizards and one snake. It is clear then that almost all snakes are considered toxic, although in one instance, the red racer, there seems to be disagreement on the subject. But when the figures are broken down to the fatalities, this pattern disappears. For here, only both rattler, *Xanthusia*, *Coelonyx* and *Crotaphytus* are considered potentially fatal to the Seris, and the sixth, the coral snake, is supposedly fatal to the Mexicans but not to the Seris. There are good grounds for believing that, under certain circumstances, the bite of both rattlers, especially of the diamondback, can be fatal and there are cases on record [165] when a young child (Seri) from Desemboque and a young man were killed by the large rattler—within the past few years (1950-1954). The sidewinder is slightly less feared, no doubt because it is smaller, but they think it does always cause illness. Both rattlers inflict the toxic bite with the two large teeth in the front, where the venom is stored. They both have venom also stored in the head and in the rear section of the body two inches or so from the anus. So, at least, the Seri think, and when they deliver the rattlers to the frying pans, they always are careful to cut off the head and the tail and throw them away. This 171 belief in the location of snakes' venom in the head and the tail, in a variety of species and generally *825 of snakes (whether actually toxic or not), seems widespread in a good many parts of the world in areas where snakes, especially the large ones, make up a favorite dish of the aborigines.[12] Of course, this belief in the location of the venom in the head and tail of the rattlers is also shared by the Mestizos of their area.

*825 The coral snake represents somewhat a special case and is a good indication that many such ideas may owe their origin to the actual observation. This snake is greatly feared by the local Mestizos and is considered by them to be at last as deadly as the ratttlers, if not more. The Seris also think that it is venomous; they believe that it harbors venom in the head and tail and also that it inflicts venom with the fangs. But they also say that it does not bite as readily as the viper and that it is fatal to the Mexicans but not to the Seris. It is not hard to guess that the basis for this difference in the toxicity is the fact that the snake probably never has bitten any of the Indians. But the Seris

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[12] I have observed this, by the way, among peoples of Victoria and Duala in the Cameroons—except that the belief there was associated with the large African rock python.

[P. 29 B]

*825 heard the Mexicans talk about the dreadful consequences of its bite, and they took them at their word!

However, it will be seen that not one of the snakes is considered to be dangerous in any way on mere handling of its body. Coral snakes, though actually potentially fatal, do not bite readily and often may be handled with impunity.

This then leaves the three lizards and the toad in the category of potentially fatal animals. This is mysterious because not one of these lizards is in any way harmful.

Of these, the leopard lizard (*Crotaphytus*) is dangerous simply through biting and through venom which it has in its teeth. The Seris seemed dubious, somewhat, if this beast could kill other men, but they were sure it could kill them (the Seris). They also denied that wild animals could die from its bite. This situation is difficult to explain except perhaps by an existence of some sort of myth connected with this lizard. It may be also that the vile temper of *Crotaphytus* when captured has persuaded the Seris that any animal so vicious must be dangerous.

But the two little perfectly harmless nocturnal lizards, the gecko and the *Xanthusia*, represents a different stripe of danger, but they are feared just as much as any of the really venomous snakes (rattler) if not more. Neither of them will bite, [753] the Seri say, but they'll cause an illness on touch which can be fatal and at best they'll cause an illness of the lungs which can also be fatal. In addition, touching them will cause flesh to fall off one's hands and body. This, the informants explained, was the reason why they were not eaten. That both of them are terribly feared, the gecko even more than the *Xanthusia*, I had examples galore. While collecting with the Seri in the dried-up sahuaros, we encountered a great many of these lizards after breaking up the logs. Invariably the Indians fled and retreated obviously alarmed at the sight of the wiggling little creatures and when I picked them up bare-handed they were altogether shocked. I could not persuade them to touch even later specimens killed in alcohol. Some showed clear fear of picking up or touching the vial in which these lizards were preserved. A good 171 possibility is that this belief is in some ways connected with the European folklore about the salamander. *825 The gecko is called in the local Spanish *salamanceso* which means salamander. And the salamander, in the European mythology, may inflict harm on people in the very same manner as the gecko is supposed to do. The Mestizos, a good many of them at any rate, also hold similar views. There is a general similarity in the appearance and outward behaviour of the gecko and the salamander and, perhaps, we have here a transfer of

[P.30A]

+825 [171] an idea from one animal to another.[13] The *Xanthusia* does not share this similarity to the salamander in appearance, but it is found along with the gecko and behaves much like the gecko when exposed to the light. Hence, perhaps, comes the association.

I excluded here from the discussion the red racer because the notions concerning it are conflicting, with some informants insisting that it is toxic and can cause death and others that it is not. But all agree that it'll bite—and painfully so.

Finally the toad. The toad, although unagressive and considered as such, is feared a great deal as a repository of all sorts of toxic traits. There was some disagreement as to its ability to bite, with some informants thinking that it does bite with its tongue, others thinking it can't bite at all. But all agree on the following attributes of the amphibian: venom in body, toxic on touch, always fatal to eat to most animals and to all men. In [262] this the toad joins the gecko and the *Xanthusia*. These too are believed to be fatal to eat and these three represent the only animals in this class that are considered inedible.

It is interesting that the list of toxic (though non-fatal) animals should also include the *Phrynosoma* although here there seemed to have been again disagreement between the informants. The lizard is perfectly harmless and actually will not [753] bite even in self-defense. But the Seris say it causes swelling.

752 278 For the rattlesnake bite, the remedy is a plant called *Kásoz*. An extract of this plant is made after boiling it in hot water and then it is taken orally. It is also applied to the wound and, the Seri say, it must be taken all day long for a full day. The Seris take this when they are harmed by these snakes. This plant is supposed to be found in the mountains near Kino but not in the Desemboque or Tiburon area. But in addition to their own medicaments, the Seris, especially the younger fellows, will make use of the regular anti-venom available at the school or mission.

Attitudes Toward Reptiles and Amphibians

+825 With the few exceptions, these animals are not particularly feared. Those that are feared are considered dangerous in some ways, and, in fact, most of them are either by their ability to inflict painful bite or by possession of venom. But otherwise, their attitude seems to be very much a matter of fact and one of unconcern, which seems to corroborate Kroeber's opinion of the Seris' psychological makeup in other matters.

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[13] Since this has been written, I have plenty of evidence that the gecko is similarly dreaded in many parts of the world.

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VI

FISHES

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Scientific	**Common Name**
Stereolepis gigas	
Mycteroperca jordani	
Cynoscion macdonaldi	
Epinephelus analogus	
Trachinotus paitensis	
Verrunculus polylepis	
Myrichthys tigrinus	
Gymnothorax castaneus	Moray
Bairdiella icistius	
Anchovia macrolepidota	
Cynoscion parvipinnis	
Mugil sp.	
Cetengraulis mysticetus	
Lythrulon flaviguttatum	Flounder?
Paralabrax maculato fasciatus	
Pareques viola	
Sphoeroides annulatus	
Anisotremus davidsonii	
Girella simplicidens	
Abudefduf saxatilis	
Gobiesox pinniger	
Hypsoblennius gentilis rickettsi	
Gillichthys seta	
Scorpaena sonorae	
Malacoctenus zonifer	
Cypselurus sp. or Fodiator acutus	Flying fish
Neothunnus albacares	Tuna
Ogilbia sp.	
Lutjanus argentiventris	
Conodon serrifer	
Manta birostris	Horned manta
Urolophus halleri	Sting ray
Mustelus lunulatus	
Shark undet.	
Shark undet.	
Shark undet.	Dogfish?
Shark undet. A.	
Shark undet. B.	
Shark undet. C.	
Sphyrna	
Galeocerdo cuvieri	

136 The largest number of specimens were identi-
fied from preserved specimens by Dr. W. I. Folett
128 of the California Academy of Sciences. This in-
luded all smaller fishes. But the largest were
determined solely from the well-known vernacu-
lar names. The large fishes of the Gulf are well-
known and have established local names among
the Mestizos. These names are also much in use
among the Seris. In several instances, however, it
was impossible to determine the species of animal.
In such cases, no scientific identification has been
made. but their distinct traits were drawn from
the Seri comments about them. their natural
*[825] history. behaviour and ecology. Seris' clear-cut
recognition of many of these features as applied
to the fishes makes most such differentiations
fairly easy.

*825 Out of 42 species in the list, nine are sharks. There are, of course, many more species of sharks in the Gulf. But Seri recognition of nine speaks pointedly of their interest in the fishes.

[P.31A]

VI

FISHES

Taxonomy

* 825 The Seri have considerable skill in differentiating between different species of fishes. There are two main groups which they recognize but which in their own mind are entirely unrelated, the fishes and the sharks. It is also certain that they consider the mantas and sting rays as creatures allied to the sharks and not to the fishes. To the Seri sharks and mantas are not fishes at all but entities of their own. It appears that there are two bases for this distinction. Fishes, as Seri see it, always lay eggs; sharks and mantas do not but instead deliver young alive (in fact some do and some don't). Secondly, the peculiar dimorphic structure in the sharks and mantas, the claspers present in the males of both, not only suggest to the Seri the male sex but also an association with another group.

On the whole, the Seris were able to distinguish as separate species almost all of the fishes for which they were questioned. There is confusion in a few instances. Although *Totuava* and the *Pinta* they think are separate, the evidence suggests that here they actually distinguish merely individuals of different age that belong to the same species *Epinephalus analogus* and that the mature individuals are called *Totuava* and the immature *Pinta*.

An interesting situation arises with the *Myrichtys tigrinus*. This peculiar and remarkably snake-like fish is considered not a fish at all but a snake. The Seri know nothing more about it, and this is where the association ends in their mind. For taxonomic purposes, this fish is included among the fishes but it should be remembered that this is not what the Seris think.

With the exception of three more species of fishes, *Ogilbia*, *Lutjanus argentiventris* and *Conodon serifer*, the Seris had at least some knowledge of the natural history of each species. But in these four cases they could say nothing, nor have they recognized the last three.

Economic Uses

226 177 According to McGee, the sea turtles and the marine molluscs are most important in the Seri economy, with the fish coming in the third place perhaps. Today the situation has changed radically. The fish became the very basis of the Seri subsistence, with the marine molluscs falling into third or fourth place in order of importance. One good reason for the change has been the revolution wrought in their fishing method with the introduction of the hook and line. This must have come into the fore after 1930 and became the dominant method of fishing after 1940. The Seris did learn to use hook and line from the Mexicans

[P.31 B]

226 and, from all accounts, also from the Japanese
177 whose trawlers worked in the Gulf in the late 1930's. Today, hook and line fishing from plank
[411] boats almost completely replaces earlier methods, the spear (pueiro) and the harpoon (barilla).
[225] Harpooning is still done in hunting marine turtles while spears are occasionally used on larger groupers and also on sharks and mantas. Harpoons were also used in connection with the latter. But since World War II the shark fishing has declined, owing to the development of synthetic vitamins and abandonment of sharks and mantas' liver oil as a source of vitamins. In these operations, the Seris were for a while involved to a considerable extent. But now they have completely switched to commercial fishing which supplies not only food but also ready-made cash from
[439] the Mexican traders, and with it the Seris can purchase luxuries of life in the Mexican *tienda*.

262 Altogether, out of 42 species listed here, the Seris reported taking for food 20 species which are as follows:

Malacostenus zonifer
Firella simplicidens
Anisostremus davidsoni
Paralabrax maculofasciatus
Lythrulon flaviguttatus
Mugil sp.
Cynoscion parvipinnis
Anchovia macrolepidota
Bairdiella icistius
Stereolesis gigas
Mycteroperca jordani
Cynoscior macdonaldi
Epinephalus analogus
???? (Pescara)
Trachinotus paitensis
Verrunculus polylepsis
Gymnothorax castaneus
Hypsoblennis gentilis rickettsi
Abudefduf saxatilis

The most important of these are the groupers, the *baya*, *pinto*, *totuava* and *mero*—the latter a giant fish often in excess of 150 kg. and nearly three meters long. The most important of these is the *baya*, a medium size fish taken daily in vary-
[226] ing amounts. I suspect that this fish accounts for more than half or maybe even 2/3 of the total Seri catch, weight-wise. Of others, none is of any importance except seasonally.

* 825 Another sort of use is made of the sharks and mantas in connection with the already mentioned exploitation for liver. Five species of sharks and the horned manta were listed by the Seris, with *chata*, *gato* and *composo* most frequent and perhaps most important.

Trading, as already mentioned, is of considerable importance to the Seris. Some fish are eaten
[439] only occasionally, but they may be traded off to the Mexicans.

262 Not all fish are eaten. In most cases no particular explanation had been offered for the rejection. But, in some, specific reasons were mentioned. The *Scorpaena sonorae* and *Cetengraulis mysticetus* are so rejected because they "are too bony to eat." *Gillichthys seta* are considered unfit to eat because of its tiny size while *Sphoeroides annulatus* is refused because of its supposed toxicity, of which more later. Finally, the sharks are not eat-

262 en simply because their flesh is disliked and unfit for human consumption. But it may also well be that some of them, especially of the giant variety, are not eaten simply because they are far too large to tackle and the Seris fear hunting them.

The Seris indicated also in some cases that larger specimens of fishes are eaten when they reach the size which would justify the effort. This is true of *Malacoctenus zonifer* which they indicated is "eaten when large," that is when at least 10 cm. long.

[226] Although only sometimes did the Seris specifically indicate that certain fishes are used for bait, it is very likely that almost all small or lesser fishes are so used.

262 178 In some cases the Indians indicated changes in preference for given fishes, with the time. For unexplained reason *Gymnothorax casteneus*, the morene, has been claimed to have been eaten in the past but not for the last 11 years. It isn't clear why the figure of 11 had been used and why suddenly in the early 40's they should stop eating it while the Mexican drool over it. But it may be also that here we have merely personal preference of the informants, as so often happens. As for the *pescara* it was formerly taken for food [439] but now it is merely sold to the Mexicans. This practice is increasing also to include the immense *mero*, even larger than the *pescara*. The fish is mainly sold but rarely eaten by the Seris themselves.

Food Preparation and Preferences

252 Food preparation is simple and in the main differs not at all from the preparation of other animal diet. The fish are either boiled whole or in part or else are roasted over slow fire on a grill. The entrails are usually discarded, but otherwise the beasts are eaten entire, eyes, brains and the rest, while the tiny fishlets are eaten complete with the scales and guts.

262 As for the preferences, as expected, there are some fishes that the Seri like better than others. The *bana* in the first place and the *pinto* in the second lead the list. The Seri prefer them to all others and consider them a real delicacy. On the other hand, there are some fishes that they'll eat only under protest, meaning when times are hard. *Girella simplicidens* is one such creature. The *Puerco* or *Cochi* is another. I have seen boat loads of puercos brought in with the other fish and un- [231] ceremoniously dumped out on the beach to the dogs. Literally! The Seris took to this fish only when fishing was poor during the wintry days when they were held ashore by the weather. Even [183] then, they tried to eat the despised creatures on the sly, avoiding being seen doing this, and when I or the Mexicans picked up fresh fish from the beach to take home they laughed saying that we acted as a *cochi* (pig) would!

Other Economic Uses

* 825 237 322 One use made of fish concerns two species of sharks, the *chato* and *camposo*. Here, the informants claimed, the oil from their liver had been used in earlier times for polishing wood. This is

* 825 quite possible but I couldn't substantiate the story
237 from contemporary evidence. Perhaps during the
[322] height of the shark hunting for the liver oil, the
Seris used the oil also for wood polish, although
it isn't very clear just what sort of artifact they
make would require such treatment. The wooden
tools or artifacts among them are in short supply
at all times. Finally, the huge horned manta was
supposedly hunted also for its hide but just in
what circumstances it was not explained. It is the
only fish which the Seri ever mentioned as having
been put to such use.

Fishing

226 As already mentioned, fishing nowadays is
largely accompanied from flat-bottomed boats
with hook and line. The old ways of getting fish by
spearing are almost gone for good. Recently, an
[177] attempt has been made to teach the Seris siene
fishing, but 10 years of these endeavors accomplished
only ruination of a number of expensive
nets and of much fishing gear and the desertion
of the project by the Indians. It may be that their
[157] individualistic and almost anarchistic attitudes
preclude cooperation, essential in this type of
fishing.

The bait is obtained in any one of the three
ways: by dynamiting fish in tide pools or
along the shore, or by catching small fry with
small hook and line, or finally by collecting small
fishlets in the tide pools, prying them out from
under rocks or simply—and here the Seri boys
[857] excel—by shooting them in the tide pools with tiny
toy arrows or simply spearing them with a stick.
The dynamiting is done with the purchased sticks
[177] of dynamite which the Seris obtain in the tiendas.
The procedure is often risky and down right dangerous.
Some of the Seris have blown themselves
up with dynamite. I have seen one of them, who
lost both arms and had a jaw broken during a
dynamiting trial. He went about with a dirty rag
tied up over his head to support the wrecked
[164] jaw-bone. He was carried off by measles two years
later in the 1955 epidemic.

The Seris' commercial fishing is pretty much
226 controlled and exploited by the two or three Mexican
648 fish traders from Nogales and Hermosillo.
These have their tiendas in Desemboque, which
439 at set price sell things to the villagers. They also
provide the Indians with the five horse-power motors
443 for fishing trips and pleasure cruises and with
the oil and gasoline essential to run these—also
[501] at set price. They finally purchase the fish—at a
set price—and from the proceeds the Seris purchase
goods at the tiendas, completing the cycle.
Not all Seris are compelled to work for the Mexicans,
and, in fact, they do not always do so. Some
[501] families stay away from Desemboque and depend
on the sail and oars for propulsion. They come to
the village only once every few months to obtain
supplies. Even when in the village, the Seris make
little effort to fish for more than they wish to get
in order to satisfy their immediate needs.

226 Fishing expeditions usually take place in the
morning. Most Seris will set off before daybreak
and will return with the catch by 11 a.m. or noon.

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226 Occasionally they'll stay a little longer and when far off in the Gulf, they will return only in the afternoon. But this is not frequent. Some of the bait catching is done during the night by the light of torches or Colemans.

[731] [251] As already mentioned, unfavorable weather may put off fishing for several days and when that happens, famine becomes a real menace to the Indians because they have no supply of food stored away for the lean day and no cash for such purposes.

Sexing

*825 Sex differences in fishes have been observed by the Seri probably in the majority of the species from the list, although for several there is no data available. The tabulation breaks down by the number of species as follows:

	number of species
Sex differences observed	22
Sexes alike in all respects	6
Didn't know what differences there are	6
No data	8

The six species in which sexes are considered indistinguishable in size and color and in other respects are *Pescara*, *Pinta*, *Baya*, *Pinturera*, *Smyrna* and the undertermined shark *sp. C*. The inclusion here of the most important economic species such as *Pinta* and *Pescara* and of the sharks is interesting. It shows, in the main, probable lack of information rather than ignorance of differences on the part of the Indians. It was probably an oversight in questioning, for surely the sharks' sexual differences are usually known to them and it is improbable that they could never tell the difference between the sexes of their most important marine game.

The species in which they expressed puzzlement over the differences and simply indicated that they didn't know the answer were largely little known forms about which they could tell very little anyway, either because they occurred far away from their territory like, for example, the flying fish and the tuna, or otherwise were obscure species, too small to pay attention to, or finally, the huge monsters, too big for them to hunt and approach for more careful inspection.

In more detail, a number of different sexing criteria seem to be employed by the Indians. These differences are tabulated below:

Males larger	**Females wider, larger in bulk, but length the same**
Abudefduf saxatilis	*Cynoscion macdonaldi*
Gymnothorax castaneus	*Trachinotus paitensis*
Girella simplicidens	*Cynoscion parvipinnis*
Anisotremus davidsoni	*Mugil sp.*
Gillychthys seta	*Bairdiella icistius*
Sphoeroides annulatus	**Males more brightly colored**
Pareques viola	*Paralabrax maculofasciatus*
Females larger	*Hypsoblennius gentilis*
Epinephelus analogus	

Other sex differences considered by the Seri are structural and appy to the sharks. They associate the presence of the "2 penises" in the sharks and mantas with the males and their absence with the females. The "penises" are, of course, sex claspers present near the vent in the male sharks which aid them in holding up the female during the mating. These differences had been observed

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*925 by the Seris in most species of these creatures and in the few in which they couldn't tell what the differences were, all, as already mentioned, were species they consider too dangerous to approach. Otherwise, they think the tendency for the sharks is to have both sexes equal in size.

The tabulation above throws interesting light on the Seri notions and suggests presence of cultural stereotypes in many cases, rather than of empirical observation. Where data are available, the indication is strongly in favor of considering the males larger than the females, the very opposite of the natural tendency in the fishes. Another of these has to do with the coloration and when color differences were indicated at all it had been suggested that the male was brighter in color than the female. It is instructive that this is where two different fishes had been confused for this very reason. *Hypsoblennius* is considered a male of *Malacoctenus* because it has a red throat. Both the tendency to view the male larger than the female and the tendency to ascribe brighter coloration to the male appear again and again in various groups of animals.

Concerning the size differences, where indicated, the difference often had been expressed in numbers, such as a foot or half foot longer and so on.

The tendency to consider the female fish bulkier and the male fish leaner and narrower may appear independently of any other criteria. This is well explainable on the grounds of temporary increase in bulk during the time when the female carries eggs, although the informants did not always indicate this. However, in some other instances, this fact has been pointed out by them. The difference between the male and the female was one of the female being filled with eggs.

I could not account for any other differences between the sexes in fishes. They consider both sexes no different temperamentally and either equally harmless or equally dangerous. They also indicated no differences in their own preference [262] for the flesh of either sex in fishes, not even at the time when the female is gravid. This would indicate no special predilection for the fish roe in their diet.

Age

Only in three instances the informants made a stab at guessing the life span of the fish. The age span of the *Lisa*, *Corvina* and *Pinta*, the informants estimated at roughly 5-7 months. For the remainder they simply said "I don't know." The answers, such as they are, indicate individual ideas of what the length of life in fishes might be rather than any sort of generalized cultural concept. Of course, there is no way for the Indians to guess even anywhere with a near accuracy the hypothetical age of fishes. As a matter of fact, little is known among the biologists about the upper limits of longevity in fishes and only beginnings had been made in a few economically important species to ascertain the rate of annual growth for immature fishes.

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Weight and Size

*825

Far more accurate and more detailed information the Seris gave for the size and weight of fishes. Here specific and varying data was suggested for the majority of the species about which they were questioned for almost all about which this question had been asked. The conspicuous lack of data here is for the flying fish and the tuna, both of which are known to the Seris only from hearsay.

The responses then ran pretty close to the actual figures, both as regards the size and the weight. Only in some of the outsized sharks, the informants showed a tendency toward exaggeration in both respects, which shows clearly how the opportunity for close examination may influence their ideas of the subject.

Occasionally they showed good orientation concerning the range of size of fishes within the certain groups. Thus the dog-fish had been indicated as the smallest of all sharks.

Food

Food had been indicated for the vast majority of fishes. Only in a few, the replies were the customary "quien sabe." The diet of fishes, the Seris think, is almost entirely carnivorous because for only two, *Lisa* and *Scorpaena*, they suggested herbivorous diet. The *Lisa* is supposed to feed on soil but not on algae or animals while the *Scorpaena* feeds on the *Sargasso* (sea weed).

Among the carnivorous and cannibalistic fishes, the kind of animals eaten by fish as a rule has been pretty much scaled down to the size of the predator. The larger the fish, the larger animal it'll eat. In the majority, cannibalistic diet of fishes has been indicated. Thus the range is all the way from the *Anchoa* which they say feeds on tiny animals the size of sand grain, to the *mero* and large sharks which they say feed on almost any creature smaller than themselves. Some fishes had been indicated indirectly as bottom feeders, as crabs and octopi are supposed to be included in their diet. The *gato* shark is said to feed on some sort of non-descript animal which the informant described as "neither fish, nor octopus, not shrimp, nor bird." From their description it was impossible to divine just what sort of animal it could be. The upper limits are reached by the *Camposo* shark, which they say take not only fish but also full size sea-lion. Curiously, they have never suggested that any of the fishes habitually feed on the humans.

Predation

All sorts of animals will prey on the fishes, according to the Seris. Majority of the predators are fishes of other species. But they include the sea-lion and various birds, especially the pelican. Although elsewhere they said that the coyote will feed on marine fish, they never indicated just what kind of fish the animal takes. The predators are usually scaled up and down according to the size of the victim. The birds and the pelican, of course, will feed on small fish. Among the

*825 fishes, the larger the species, the larger prey it takes. *Lisa*, *sardina*, *sardinera*, small *pinta*, *puerco* were most frequently mentioned as victims of predation. The *sardinera* is supposed to feed on the sardina, hence, they say, it takes its own vernacular Spanish name. Finally, in the upper size limit, among the largest, mantas and sharks, they say there are no enemies—the size of the fish eliminates any danger.

226 The frequency of predation has been noticed by the Indians and, as a result, they often use appropriate kind of bait for the kind of species they wish to capture. Thus different kind of fish or an octopus will be used as a bait for the species they think feeds on these rather than on other animals.

Development

*825 The division of fishes into viviparous and oviparous is clear cut. Of the 33 species for which detailed responses are available 23 are considered oviparous and 10 viviparous. All of the latter are sharks and mantas. The knowledge of this fact stems unquestionably for the most part from the relatively recent experience in hunting these animals for the liver. Even though at present this occupation went into disuse, the knowledge gained in the course of it still persists.

The responses indicated that the larger the shark or the manta, the fewer young it will have. And, in fact, the informant indicated this by a blanket statement to this effect. The largest creatures in this group has, they say, two young as a rule; the smallest, a dog-fish, will have 12-14. An exception is the smaller sting ray which they claim will have 1-2 young .

The rest of the fishes carry roe and deliver eggs. The number of the eggs has always been indicated as "many" but sometimes a stab at a figure was made and, for example, *Anisostremus davidsoni* is supposed to have about 1000 of them. It appears that the Seris were convinced that a fish which is not a member of the shark family is automatically an oviparous creature. Even when not familiar with the roe of a certain species of fish they were apt to indicate that it must have it.

There were few negative responses and these were largely associated with the little known forms. Tuna, flying fish and the snake-like fish *Myrichthys tigrinus* which they think is a snake and not a fish belong to this category. Exceptionally, one of the better known fishes, the *corvina*, was also in this group and it is difficult to explain this ignorance of its natural history.

When the fishes mate is a mystery to the Seris, and, for some reason, there is little association between the mating and delivery of the eggs. This is all the more strange, because mating takes place immediately after the delivery of the roe. This suggests that the conventionalized Seri idea includes a time lapse between mating and delivery of the egg or the live offspring in most animals. How this works could be seen in the birds and mammals. The only instance when mating season has been pinpointed by the informants concerns the horned manta which they say mates

*825 in May. But then, the mating antics of this huge creature are quite spectacular.

Although two of the informants made the blanket statement that "all sharks mate in May," the detailed information concerning the season for the delivery of the young does not entirely support this belief. Only a few species had been specifically described as delivering the young in May. The sting ray does this in March and the undetermined shark *sp. C.* in November. This then gives a great deal of latitude to this activity (among the sharks). On the other hand, among the fishes proper, roe laying, the Seris think, is associated essentially with two periods, spring and fall, with none in the winter and very little in the summer. The tabulation below shows the breakdown by species for those for which the data are available:

Cynoscion macdonaldi	March
Epinephalus analogus	April
Lythrulon flaviguttatum	May
Paralabrax maculatofasciatum	May
Sphoeroides annulatus	May
Girella simplicidens	May
Verrunculus polylepsis	"?
Gillichthys seta	August
Pareques viola	September
Mugil sp.	October
Hypsoblennius gentilis rickettsi	October
Stereolepsis gigas	October & November
Pescara	October
Bairdiella icistius	November
Anisotremus davidsoni	November

There is little indication that they have any idea of the time elapsing between the delivery of the roe and the emergence of the fishlets. Only in one species this has been indicated. The *lengvado* (*Lythrulon*) "lays eggs in May and the young emerge right away." But what is the basis for this statement I do not know.

In several instances different growth forms within the same species are recognized under different names, while simultaneously the identity of these forms is well understood. This is especially true of the large economic species. Small *totuara* (*Cynoscion macdonaldi*) is called in vernacular Spanish *mácharros* and in the Seri *tc.kokái*. It is interesting that when the *totuavas* come to the bait, first come the *macharros* and the real *totuavas* follow. Somewhat similar distinction is made for the bayas. The adult *baya* is called *Kanx* in the Seri language, and likewise at the head of the *báya* schools come the immature individuals, the *ot'tasa*. In another way, evidently, there is also a distinction drawn between *pinta* and *sardinera*, appearing to be the mature and the immature forms of the same species, *Epinephalus analogus*.

The Seris recognize that there is no parental function among the fishes beyond the delivery of the roe and mating. This is implicit in their responses even if they make no explicit indications. In no case they ever suggested that either one or both of the parents ever look after the young. Rather a contrary notion is obvious. The fish will feed on their own kind and are notorious cannibals and this, to them, is obvious from baiting fish while fishing.

[P.35B]

Migrations

* 825

Clear differentiation is made between local and seasonal migration. Several of the fishes, the Seris say, do migrate locally, keeping on the move all the time, but these movements, according to them, are not directional, that is, the fishes do not go away with the season. *Cocki*, *pinta* and *Sphyrna* sp. and one of the undetermined sharks belong here. Sometimes, the *cocki* gather in "millions," as the Seris say, but just keep moving.

Another kind of migration well recognized is seasonal. Here belong 13 species which include most of the sharks and also the following: *baya*, *totuava*, *sardina*, *corvina*, *lisa*, *anchoveta* and *chano*. There are several facets to this event. Sometimes the migration is indicated as taking place between north and south; in others it is supposed to proceed from the shallower to the deeper waters. Three of the sharks and the *choveta* proceed north in the spring, May or April, and go south in the fall (November or October). *Totuava* and *sardina* travel between the "deep of the Gulf" and the "shores" in April and November respectively. The *gato* shark does the same thing in May and October (May to the bank, October to the deep). All this indicates connection with the seasons and search for warmer waters during the cold season. There are also other sorts of migrations. *Lisa*, which the Seris say is not highly migratory, goes to the Esteros during the cold season. This migratory habit accounted in the Seris' view for the presence or absence of certain fishes in the localities such as Kino or Desemboque, although even more frequently they explained this in terms of ecological factors, as shall be seen later.

On the whole, the migratory fishes are usually the large species that live in the deep waters rather than the small ones that habitually live near shores. The migratory fishes, excepting sharks, usually gather in great numbers, in "million" as the Seris say. The sharks, on the contrary, may migrate but they do so singly, especially when large.

In some cases there seem to be the reverse of the generalized trend. *Pinta*, for example, is said to spend the cold season in shallower waters. The big manta (horned manta) shows up near Tiburon in October but next month returns south.

Seasonality

Some suggestions of seasonal occurrance of fishes already showed up from the data. But for many fishes, greater or lesser frequency of given species is associated with the season while in nearly half of the total number of species, there is no difference in this respect. The data is clearly available for 29 species and the breakdown is as follows:

Either more numerous or present only in cold season	5
Equally common in both season	17
More numerous or present only during the summer	7

Some of this is connected with the annual migrations, as already indicated. A tabulation of some of the forms may be useful, as it may go

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*825 some length to explain the Seris' seasonal dependence on certain species.

Summer forms	Winter forms
Scorpaena sonorae	*Epinophalus analogus* (*pinta*)
Epinophalus analogus (*sardinera*)	*Bairdiella icistius*
Anchovia macrolepidota	*Cynoscion parvipinnis*
Anchoa sp.	*Manta birostris*
Urobatis halleri	"*Pescara*"
Mustelus lunulatus	
Shark sp. A.	

The inclusion of *Epinophalus analogus* under both headings suggests even more clearly than anything else that here we are dealing with the mature and immature form (*sardinera* being immature, *pinta* mature) of the same species of fish which the Seris think represent two distinct species. There is some other information given by them which also supports this contention.

The distinctions just mentioned are not absolute. Sometimes it is merely indicated that the fish is more common during the winter than during the summer; sometimes it is completely absent during the winter.

Other seasonal distinctions have already been discussed under other headings and there is no point in going into the detailed argument about them. It is enough to remember that there is also seasonal recognition of the time when the eggs are delivered and in some, very few species in fact, also of seasonality connected with the mating.

Rhythm

There is very little data available concerning the time of the day favored by the fishes. I have it only for seven species of these *Pescara* and *Sphoeroides annulatus* are considered diurnal in their activity, while for the remaining five species both day and night had been indicated. The suggestion is that the Seris think fishes are active both during the day and during the night. This represents a striking contrast with the terrestrial creatures where there is fairly clear dichotomy on the whole. It is also different from the ideas of the inland peoples who fish on fresh water fish and who recognize considerable differences. Although the Seris themselves prefer to fish in the morning, it may well be as much owing to the distance they have to travel to the fishing grounds as to the feeding habits of the fishes.

Ecology

Some of the ecological factors already have been indicated: the preference for the deeper or shallower waters in association with the season. These will be discussed in a greater detail here. But there are also others and one of the most frequent factors is a matter of background habitat of the bottom over which the fishes live. This is usually indicated either as sands or as rocks, with clearly indicated differences. There is no doubt that these matters are very familiar to the Indians.

One of the informants made a blanket statement that most species of fish live on rocky shores and not on sand, and his idea is supported by the

4 825 analysis of the data given for the individual species. Where such data are available, for 21 species, fully 15 show preference for this kind of habitat and only six, it is said, prefer sandy bottoms. In many instances, such ecological preferences had been very emphatically pointed out and the informants denied that the animal lives over either rocky or sandy bottom, as the case might be. Geographical distribution has often also been indicated in the same manner, and explanation for the presence or absence of a fish in a certain place has been represented in just these terms. But this will be discussed later on. On the whole, the rock-loving fishes are all of the small species and economically not particularly important. The six sand loving species are:

Sphoeroides annulatus
Lythrulon flaviguttatum
Myrichtys tigrinum
Mugil sp.
Cynoscion parvipinnis
Bairdiella icistius

There are a few more factors introduced into the ecological considerations. Sometimes ecological preferences had been indicated for the large and immature individuals of the same species. Thus the big *mero* "live in deeper water 25 meters or more deep" while the "little *meros* go to the Esteros." The large shark *pinturera* is said to be absent from Desemboque because "it is too shallow there" and this presumably holds true also for other sharks. A similar situation pertains to the sting ray where the smaller individuals do come to the bank. Sometimes the fish may keep to the deeper waters but stay on its surface, and here, the Seris say, belongs the *choveta*, a small fishlet, traveling about in countless schools.

Distribution

The distribution charts[4] of fishes indicate in the main the Seris' familiarity with the coast. The locality near which they live or places where they fish show the great number of species listed by them as present. The further away from Desemboque and Tiburon, the fewer species are listed. [484] [226] The Seris do not go to the coast of Baja California to fish, hence no species are listed for it. Those that are marked so are the species which the informants included under a blanket statement "present everywhere." The basis for this kind of statement seems to be the frequency and numbers of fishes that are encountered.

On the other hand, there are a number of such records that are indicative of the ecological preferences and frequently a fish might be marked

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[4] [see category 116 - pp 63-64. - Analyst.]

* 825 for Desemboque or Porto Libertad but marked negatively for Porto Kino and reverse. Kino is sandy, Desemboque is rocky. Hence the difference.

With two exceptions, all sharks are marked as ubiquitous but sticking to the deeper waters of the Gulf or as the Seri would express it "found in the Gulf." This sort of thing is hard to mark on the chart and therefore a blanket statement covering all such is indicated.

Toxic or Dangerous Fishes

Very few fishes are considered really dangerous or aggressive. There is a generalized notion, undoubtedly not entirely unfounded, that the large sharks are dangerous and that they'll make dinner of humans if given an opportunity. They are also feared for their strength and for the size of their teeth, regardless of whether or not they are aggressive. The huge sharks, most likely the whale sharks, had not been hunted by the [226] Seris, so the informants say, owing to their size and brute strength. Larger real fishes, *mero* and *totuava*, are also considered large enough to throw men into water, though not aggressive. The same goes for the manta.

The smaller mantas and the sting ray are greatly feared, owing to their possession of a nasty spine with which they can sting badly. The smaller sting rays are particularly feared in this respect because they bury themselves in the shallow sandy beaches and cannot be seen. The sting is painful and is also considered toxic although the toxicity is actually due to the accumulation of slime and danger of infection.

Two other fishes are considered toxic but harmless. *Myrichthys tigrinus*, which, as already mentioned, is believed to be a snake, is said to have venom but is harmless because it does not bite. *Scorpaea sonorae* is also believed to be venomous and "the venom is located in the spines in the fins." This creature, the Indians say, may inflict pain which will last for a full day. Finally there is the odd case of the little *Sphoeroides annulatus*. [262] This one is thought to be venomous in the flesh and therefore dangerous to eat. The explanation for this was offered as follows: "100 years ago a Seri man ate one and died of its venom. It was very long ago. Maybe 100 years."

It is difficult to account for this story unless someone actually ate a fishlet so utterly rotten that septic reaction set in and the man died of food poisoning. It is also not likely that such a trivial event would be remembered as far back as 100 years ago.

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MOLLUSCA

VII

	Scientific	Common Name
136	*Octopus bimaculatus*	Two spotted octopus
	Tectibranchiata	Sea-hare
	Ischnochiton Magdalenensis	Gulf Chiton
	Ischnochiton laevigatus	Chiton
	Codakia distinguenda	Clam
	Cardium consors	Cockle
	Laevicardium elatum	Giant Cockle
	Carditamera affinis	Ruffled clam
	Acmaea dalliana	Limpet
	Crucibulum spinosum	Spiry Limpet
	Chione undatella	Frilled chione
	Chione californiensis	California chione
	Pteria peruviana	Wing shell
	Isognomon chemnitzianus	Pouch shell
	Volsella capax	Horse mussel
	Crepidula squama	Boat shell
	Olivella dama	Olive shell
	Cypraea annettae	Annette's cowry
	Tegula rugosa	Turban shell
	Conus regularis	Cone shell
	Phyllonotus erythrostomus	Pink-mouthed Murex
	Turritella broderipiana	August shell
	Polinices recluzianus	Southern moon-shell
	Phallium abbreviatum	
	Chlamys subnodosa	Noded scallop
	Atrina maura	Pen shell
	Naicula pacifica	
	Turbo (Callopoma) fluctuosa	Turban shell
	Solenosteira pallida	Top shell
	Cerithium stercusmuscarum	Spindle
	Knefastia funiculata	Spindle
	Neritina luteofasciatus	Nerite
	Columbella fuscata	Dove shell
	Trivia radians	Coffee bean
	Tellina rufescens	Tellen shell
	Ficus ventricosus	Fig shell
	Niseke histrionica	?

136 128 [126] While most specimens were identified from live material collected in tide-pools and kept in buckets as long as they lasted, some dead shells had also been used, especially those from the kitchen-middens rather numerous in the immediate Desemboque area.

By far most of the species had been identified by Dr. J. P. E. Morrison of the United States National Museum. To these I added a few identifications of my own, while Dr. Grace Pickford of the Osborn Laboratories, Yale University, identified the octopus and Dr. Rudolf Stohler of the University of California identified the chitons.

Economy

*825 A very considerable proportion of the molluscs is used by the Seris in various ways. The tabulation will present the data much more clearly than could be done in a discussion.

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MOLLUSCA

VII

301
* 825
262
439
[226]

Species	USES Food Pres.	Past	Decoration Pres.	Past	Trade Pres.	Past	Bait
Octopus bimaculatus	x	x				x	x
Codakia distinguenda		x					
Laevicardium elatum		x			x[1]		
Carditamera affinis	x	x					
Acmaea dalliana			x	x	x		
Crucibulum spinosum		x	x	x	x		
Chione undatella	x	x					
Chione californiensis	x	x					
Pteria peruviana	x	?	x	?	x		
Volsella capax	x	x					
Olivella dama			x	x	x		
Cypraea annettae				x[2]			
Tegula rugosa		x		x		x	
Conus regularis		x[2]		x	x	?	
Phyllonotus erythrostomus		x				x	
Turritella broderipiana		x[3]			x	?	
Polinices reclusiana	x	x					
Chlamys subrudosa	x	?					
Atrina maura	x	?			x[4]		
Navicula pacifica		x					
Turbo fluctuosa	x	?			x		
Solenosteira pallida			x	?	x		
Cerithium stercusmuscarum			x				
Trivia radians			x				
Ficus ventricosus	x						
Nioche bistriunoca	x	x					

[415]
[436]

[1] Occasionally used as dip spoon

[2] Supposedly used in the past for money

[3] In the past "giants of 300-400 maybe years ago have eaten it."

[4] Only pearls

* 825
114
These figures show then 26 out of 37 species exploited economically in some way, that is 70%. These figures show increase over the figures I have published previously (1956) which were 21 out of 36 species and 58% respectively. The corrected figures are the result of brief additional field work in 1955.

Food

262 A good part of the molluscan forms are used as food. Altogether 19 species are listed as such, although out of these, only 11 were reported as being part of the diet today while the remainder only in the past. It is obvious that there has been progressive decrease in the Seris' dependence on [178] the molluscan diet within the past few generations.

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Four of the species reported as part of the Seri diet at various times had been collected from the kitchen-middens. There are: *Pteria peruviana*, *Chlamys subdudosa*, *Volsella capax*, and *Navicula pacifica*. Of these four, *Navicula* has been reported as eaten in the past "maybe 100 years ago, but not

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262 172 now," while the *Volsella* has been eaten in the past just as much as it is now. The find of these four species in great numbers in the kitchen-middens only indicates that they probably were an important part of the Seri past. Historical records are scarce and no archaeology had ever been done in the region, except for Gifford's (as yet unpublished) excavations at Caborca. But Caborca is far away from the coast. Strong circumstantial evidence suggests that a good many of the kitchen-middens represent relics of the Seris' past encampments.

262 The verbal data for the Seris' past use of some species of molluscs in their diet is uncertain or unavailable. But it is safe to assume that if the animal is eaten today, then it certainly had been [174] also eaten in the past. It is not probable that the Seris should suddenly develop a taste for obscure kinds of animal food, while the entire trend had been in the other direction.

Of the different species the augur shell and the cone shell were said to have been "eaten in the past by the giants. Maybe 300-400 years ago." It is [173] hard to account for this idea except that it probably refers to a myth.

Preparation

252 Preparation of the molluscan food differs little, if at all, from any other food of animal origin. The animals are simply separated from the shell, the meat is dropped in water and boiled, usually [263] for half an hour. Few ingredients other than salt are added and their use depends entirely on the availability of cash and on the individual tastes of the Indians. As far as I could tell, there is no differentiation in this for people of different sexes 262 or ages. Also there is no preference for different parts of the body.

Preferences

Some species are more liked than others, but this is related to their size rather than anything else. There does not appear to be any belief in the toxicity of molluscs and the occasional justification of the inedibility has been expressed in terms of size. Some species, it had been asserted, are not eaten simply because they are too small to bother. Only *Cardium consors*, as one of the in- *[825] formants suggested, is venomous, but even this, to him, seemed uncertain and dubious for he said "maybe it is venomous."

Other Uses

301 *825 a) *Decoration*: A considerable number of shells were reported as used for decoration. The tabulation indicated altogether 10 species that had been or still are used for ornament. Three of these are discarded now, seven still in use. This is mostly in the form of various sorts of necklaces, which the women string on ordinary thread. *Solenosteira pallida* is supposed to be worn as such by women and children, while *Cerithium stercusmuscarum* by the boys only. But I have never seen either of them make use of it in any way. On the other hand, *Trivia radians* and the *Olive shell* are much

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301 * 825 worn. I have observed women wearing necklaces of the fo[illegible]and women and very young boys of the latter. The olive shell, incidentally, is made into two sorts, the natural, unroasted shells which retain a greenish-purple, mottled color and the white. The white pallid color is achieved by roasting the shells over fire. The necklaces are mostly made up of either colored or white but occasionally they may be made of mixed shells and then they are usually alternately interlaced, now with one, now with another.

* 825 [412] [415] b) *Utensils:* Two species had been reported used as occasional drinking or dipping cups and spoons. *Lavicardium elatum* and *Ficus ventricosus*. *Ficus* is presently discarded, but the *Lavicardium* is still occasionally used so. There is no doubt that the incidental use of these shells increases during longer fishing expeditions when the Seris are apt to lose some of their gear.

[436] [171] c) *Money:* Interestingly, the brown cowry was supposed to have been used as a means of exchange, as money—in the past. If this is so, then the selection of this shell for such purpose is not surprising considering its widespread use throughout the world.

439 * 825 [177] d) *Trade:* Altogether 12 species had been reported as traded off either in the past or present. The trade importance of various species of shells varies with the demand of the market and sometimes may be only sporadic and short-lived. Only a few of the species had been indicated as having been of any trade importance in the past, and it may well be that the Seris did not register the species which may have been briefly sold to and outsiders during the short-lived fads of demand. It may be said in general that the trade importance of the shells increases and that greater variety of them are exploited now than formerly. This is surely owing to the increasing accessibility of the Seri country and the increasing tourism, not only, visitors from Hermosillo, but also from such far flung places as Tucson, Phoenix and even Los Angeles.

[435] [237] [226] In some instances, the Seris had no idea what the shells were sold for. The augur shell is on and off sold to some American traders who show up in Desemboque once in a while and for whom the Seri women accumulate these shells. But what uses were made of these, the Indians surely didn't know. Neither did they know what uses were made of the *Murex* shell and the *Turbo*, both of which were periodically sold in bulk to Hermosillo. On the other hand, they had some idea what uses were made of some other shells. *Pteria* and *Atrina* contain pearls and these are much desired. Especially the pearls of *Atrina* which are sold to the Mexicans or to the visitors for 25-50 pesos each and therefore have immense value, for the local market. The *Pteria* shells are said to be used for button making, and the Seris themselves claim that they make buttons of this shell. The most important of all, however, at least at the time of my visits in 1953 and 1955, was the olive shell. It was easily the most commonly and most numerously collected shell of all that the Seris ever collected. Owing to the scarcity of it in Desembo-

[P. 39 B]

*825 439 [226] [415] [435] que (as a result of the ecology of the coastal waters) it is gathered in huge quantities largely on the shores of Tiburon where it is said to occur in great numbers. This animal is gathered in large bulk in 5 gallon gasoline cans and then sold either as finished necklaces at the rate of five pesos each, or as bulk, by the liters, with 20 liters for each gasoline can. There is a steady market for these shells.

226 e) *Bait:* Only the octopus has been reported as used for fish bait for the *pinta, baya* and *pescara*, and I have seen it used in that manner. But it is certain that on occasion the Seri will use also for bait the flesh of some of the shelled smaller molluscs, especially when they wish to capture live fishlets for bait.

Hunting

[462] [857] Collecting of molluscs is almost invariably a job of adult women and of the children of both sexes who at low tides scavenge the exposed mud flats and gather or dig out various marine animals. Some are collected on the surface only. Among those that must be excavated are the octopus and *Nioche* which hide in burrows or mud, respectively. A large shell is usually used as a tool to pry the *Nioche* out.

Taxonomy

*825 Molluscs on the whole are recognized as one group of animals. However, this does not include the octopus and the chitons which are considered as different sort of creatures. Some sort of feeble association between the *Pelecypods* and the *Gastropods* is recognized and various species of both are placed together. I noticed a tendency to consider some of the *Gastropods*, the limpets and *Crepidula* for example, as supposedly having two valves while in fact they are both univalves. The explanation offered for this was "it lost one side," meaning one valve.

Although *Chitons* spend most of their time motionless attached to rocks they are both considered animals. The motions of these animals may not [857] have been observed by the adult, but the Indians, young boys especially, certainly noticed the changed positions after a period of time.

In some instances the Seris observed quite small differences between animals—recognizing them as different species. In the *Neritina* two different forms were correctly identified as representative of the same species, although they differed considerably in size and color. On the other hand *Columbella* and *Solenostira* had been given the same Seri name palémex[a] but were recognized as different kinds of animals.

Sexing

A distinct tendency to consider the molluscan males larger than the females emerges readily from the Seri answers. This can be shown in the table below:

[P. 40 A]

* 825

Male larger

Chlamys subnodosa
Acmaea dalliana
Solenosteira pallida
Isognomon chemnitzianus
Chione californiensis
Polinices reclusiana
Knefastia funiculata
Pteria peruviana
Turbo fluctuosa
Atrina maura
Octopus bimaculatus

Female bulkier but smaller

Atrina maura

Sexes alike in size

Ficus ventricosus

Male more colorful

Eurytellina rubescens

Don't know

Nioche bistrinosa
Carditamera affinis
Chione undatella
Phyllonotus erythrostomus
Volsella capax
Cypraea anettae
Turritella broderipiana
Laevicardium elatum
Crucibulum spinosum
Neritina luteofasciatus
Tegula rugosa
Ischnochiton laevigatus
Ischnochiton magdalenensis

For the remaining 11 species there is no data. It is obvious then that here cultural stereotypes are at work in suggesting tendency toward larger size of the males. The fact that not once the reverse had been said makes this so much stronger. Where differences between sexes are hard to notice, the Seris will tend to think the male as the larger of the two. A faint suggestion also works in the direction of some of the other ideas on the subject already expressed in the data for the higher animals. In one species, at any rate, it had been suggested that the male is more colorful and in another that the female is bulkier if smaller. Similar sort of ideas had been expressed also for some of the fishes.

Weight and Size

These had been indicated usually as merely "this is the size to which it grows," pointing toward the animal on hand. The informant went little beyond this in the case of an octopus, saying that it grows up to a foot across the tentacles.

Age

No indication of the hypothetical age has ever been made for any of the species.

Development

That the Seris consider *Mollusca* oviparous animals is clear from the information they gave. Although the data are available only for 12 species, they all were indicated to be oviparous. Little indication has been made as to the total number of eggs delivered. The sole exception is the octopus which the informant said lays 1000 or so eggs, another way of the Seris' saying that it lays many. At other times they merely said "many."

The egg laying activity, the Seris think, takes place mainly during the summer as the table below shows:

Species	Season		
	Eggs in hot	Eggs in cold	Doesn't know
Eurytellina rubescens	x		
Chlamys subnudosa	x		
Chione californiensis	x		
Knefastia funiculata	x		
Phallium abbreviatum	x		
Cerithium stercusmuscarum	x		
Crepidula crepidula squama	x?		
Octopus bimaculatus		x	
Polinices reclusiana			x
Solenosteira pallida			x
Trivia radians			x
Columbella fuscata			x

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*825

In a few instances the informants indicated where the eggs were laid. The octopus, they say, lays its eggs under abandoned shells, while *Polinices* lays on the bottom.

Only in the octopus the informants showed more detailed knowledge of the developmental sequence. The eggs, as already stated, are laid in the cold season, while the young hatch out in the warm season, in April. No parental function had been indicated at all.

Food

Very little indication has been made concerning the food of the mollusc, as well as of the predation on them. Information had been given only for a handful of species and even that often hesitantly and sparingly. Only for two species a specific kind of diet has been suggested. *Ficus ventricosus* is said to feed on the "white soil" (meaning white sands) while *Carditamera affinis* feeds merely "on earth." No suggestion occurred at all that any of the shellfish might be predatory and even to the question of what the octopus ate, the reply was "I don't know." Yet, in fact, great many of them are carnivores.

Predation

Here again there is very little information. For the vast majority the reply was the familiar "don't know." Only for three species the informants suggested a detailed answer. The predator of *Nioche bistriunoca* and *Chione undatello* is the *puerco* but what else the informants could not tell. The octopus, the informants said, is consumed by the *baya*, *pinta*, *sardinera* and *pescara* but not by the *lisa*, *culon* or birds. The reply suggests clear distinction between predatory and unpredatory fishes. How the Seris have arrived at this idea about the octopus is not clear, but they do use these animals to bait the above mentioned predatory fishes.

Seasonality

An association between the reproductive activity of the *Mollusca* and the summer season have already been indicated, and in this the Seris' generalized ideas do not differ essentially from their ideas about other animals.

Far fuller data are available for the seasonal occurrance of the mollusc, in fact for all but two species.

	Species
Hot season only	7
More in hot season	3
Equally in both	21
More in cold season	2
Cold season only	2

The table shows that more than half of the species are equally common during summer and winter seasons but otherwise the tendency is toward greater abundance during the warm summer. This again is much in line with the generalized, if somewhat obscured idea, that there are more animals of all sorts present during the warm months, whether on land or in the sea.

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*825 [172] [262] Because seasonal deposits of shells may differ archaeologically and because they do make up an important part of the Seri diet, both now as also in the past, the dominant species for each season are listed below:

Occurring in Summer only	More common in summer
Isognomon chemnitzianus	*Chione subrugosa*
Cardium consors	*Eurytellina rubescens*
Codakia distinguenda	*Acmaea dalliana*
Pinna ventricosus	
Phallium abbreviatum	
Crepidula crepidula	
Trivia radians	
Occurring in Winter only	**More common in winter**
Pteria peruviana	*Turbo fluctuosus*
Polinices reclusianus	*Octopus bimaculatus*
No data	
Volsella capax	
Niocha bistriomaca	

In three of the species which are present only during the hot season the Seris indicated that they winter buried in mud.

Rhythm

There is a clear suggestion that to the Seri the *Mollusca* show no predilection for either diurnal or nocturnal activity but that they are active both day and night. Data for this had been obtained for 10 species and this answer has been given in every case—merely saying that "it walks day and night." This falls in line quite closely with the Seris' ideas about other creatures of the sea in contrast to the terrestrial animals. There is but very feeble suggestion that some of the fishes are either nocturnal or diurnal. Vast majority are both.

Distribution 1/A

Familiarity with the geographical distribution of the mollusca is for the Seri in a way a function of their familiarity with the particular locality. The largest number of species they cite for the localities in which they regularly camp, the smallest for those they know very little. Thus, the records indicated for the coast of B. C. are only those where the informants indicated by the blanket statement "found everywhere." But this does not mean that they actually cited the animal from such a locality.

In many instances presence or absence of a molluscan has been explained by presence or absence of its favorite habitat. The informants repeatedly pointed out that excessive sandiness of the Kino's shores is responsible for an absence of a great variety of animal there. In other cases, presence of rocks is a requirement for several others. But these matters will be discussed in greater detail under the heading of ecology.

Ecology

The Seris have a very clear-cut idea concerning ecological preferences of the *Mollusca*, a matter which is not too difficult for them to observe.

[P 418] 1/A [see category 116, pp 64-65 for distribution charts- Analyst.]

+825 To them the animals break up into the sand lovers and rock lovers and they choose the habitat accordingly. Out of the total of 37 species the breakdown is as follows:

	Species
Rock habitat	15
Sand habitat	20
Mud habitat	1
No data	1

The mud-loving creature is supposed to be the *Nioche bistrianoca*. No data is available for the *Columbella fuscota*, while the 15 rock-loving molluscs are:

Ischnochiton magdalenensis
Ischnochiton lagrigatus
Isognomon chemnitzianus
Tetibranchiata
Octopus bimaculatus
Volsella capax
Pteria peruviana
Neritina luteofasciatus
Acmaea dalliana
Tegula rugosa
Cerithium cercomuscarum
Solenostira pallida
Crucibulum spinosum
Phyllonotus eruthrostomus
Carditamera affinis

All the remaining species are sand loving. The sand-loving species are on the whole regarded as slightly more mobile and were often referred to as "crawling on sand." Several of them were said to crawl in the up-right position, this especially true of the bivalves, which observation I had been able to confirm. Sometimes other details had been added to the knowledge of the movements of these animals. *Laevicardium* and *Naricula*, the Seris say, walk under ground, the latter 5-10 cm. deep. But some are considered almost sessile and the *Atrina* does not walk at all. On the other hand, *Ficus ventricosus* is said to walk in the straight line.

. Most of the sand-loving species are also, according to the Indians, shallow water inhabitants. But some, and here we have *Phallium*, *Codaria* and *Caridum*, spend winter buried in the ground. *Nioche* as already indicated is also a burrowing

[P.42A]

* 825 creature but of a permanent variety and is said to stay buried in the mud 12 or more cm. deep—as already mentioned.

The rock-loving animals occur equally on rock and under rock and they are almost equally divided into this sort of habitat (by species). Among them the *Tagula*, *Solenostira*, *Carditamera*, *Octopus* and *Tetibranch* are considered particularly forms that make their homes under the rocks.

Toxic or Dangerous Molluscs

None of the molluscs are considered dangerous either owing to venom or otherwise. Only hestitant suggestion has been made concerning the *Cardium* that it is venomous although nothing was said about it being fatal. It is also said about the octopus that it mildly bites with teeth but that is not dangerous.

Miscellaneous

Gregariousness: Not much data are available whether the molluscs are considered solitary or gregarious in distinction to mere presence or absence of large numbers. *Nioche*, the Indians say, lives in large numbers together, while the *Octopus* is solitary and this is the extent of the available data.

Anatomy: There is little data concerning the anatomy and most of it refers to the octopus which evidently is best known of all molluscs to the Seris. The Seris recognize different major sections of the body in this animal. They think that the sack is its head, the mouth at the opening of the mantle, the teeth are to them the black marks. The octopus also has eyes and suction cups and the purpose of the section cups is well known. Otherwise the Seri occasionally will indicate whether the animal is a univalve or a bivalve, although this, as already suggested earlier, with little accuracy.

[P.42 B]

VIII

CRUSTACEA

Scientific	Common Name
136 *Cirripedia*	Barnacle
Axius vivesi	Mud-shrimp
Leptodius occidentalis	
Microphyrus platisoma	
Speloophorus schmitti	
Petrolistus armatus	
Callinectes arcuatus	
Glyptoxanthus meandricus	
Pilumnus townsendi	

* 825 All animals in this group are considered live animals—and not plants. This interestingly includes the barnacle. The only way one may account for this is probably the Seris' observation of the cracked barnacles and of the moving flesh inside. Barnacles growing on the marine turtles are also classed as animals, though of a different kind than the barnacles growing on rocks or on the mangroves. They are called *piojos de cahuama*, literally, turtle lice.

The Seris regard *Glyptoxanthus* and *Pilumnus* as the same kind of animal. *Pilumnus* is considered to be merely a large specimen and "maybe an adult," the other *Pilumnus* "is young." When questioned about the reason for the identity the informants pointed out the hairiness of both crabs.

On the other hand, although *Spelenophorus* and *Microphyrus* have the same Seri name, they are considered two different species.

Economy

262 Crustaceans play little role in the Seri diet. Very few are eaten at all and when they are, the amounts are insignificant and they are considered an inferior sort of food. The informants denied that they have eaten any of them in recent years, but allowed that two species, *Callinectes* and *Axius*, had been part of their diet in the past, although how long ago they didn't specify. There is no doubt, however, that in time of frequent sub-famines, the Indians resort to these lowly creatures. [261]

* 825 [226] [857] [411] In addition to this, *Microphyrus* had been mentioned as a fish bait. It is possible that in a pinch other forms are also so used. Finally, the most frequent function that the crustaceans play in the Seri life is as objects of play for the boys who spear them with the miniature two-pronged "puieros."

Sexing

For three species of the crustaceans the Seris indicated distinction differences between the sexes. In the two crabs, *Callinectes* and *Leptodius*, the males have narrow center plate while the female's center plate is wide, which in fact is a well-known sex difference in crab. In *Glyptoxanthus* and *Lep-*

VIII

CRUSTACEA

* 825 *todius*, they say the male is also much larger than the female although colors of both are alike. We then have here one of the general sexing criteria that runs through the entire animal kingdom.

For the remaining five species, the informants simply din't know how to tell the sexes apart, although they asserted that they are both present.

Age

No data are available for this topic.

Size and Weight

There is little information for this. It appears that the Seri considered the specimens shown to them as representing the usual size for each species. Only in *Callenectes* they indicated that "it grows a little larger."

Food

The Seris have very little information about the feeding habits of the crustaceans; with the exception of two species they simply didn't know what the animals eat. The two, *Leptodius* and *Callinectes*, they believe, are scavengers feeding on dead fish. Of course, with the lot of offal floating along the shore in the Seri encampments such observation is not difficult.

Development

The tendency is to consider the crustaceans as oviparous animals. In half of the species, it is true, the informants didn't know the answer. But the remaining four they indicated laid eggs. It is not amiss to point out here that in these matters, as also in general in matters concerning obscure marine invertebrates, the young or adolescent boys did much better than older men. Older men [857] devote their time to fishing, boys to the gathering and persecution of all sorts of small animals. The adult men simply may have forgotten some of the things they learned in their younger age. In any event, *Callinectes*, *Leptodius* and *Glyptoxanthus* and *Pilumnus* are all egg-bearing species in their view. The female of the *Callinectes* carries the eggs under its carapace. The *Glyptoxanthus* delivers its eggs in the cold season, which is the reversal of the usual Seri idea about the reproductive season of the marine invertebrates and other animals.

Seasonality

Here again there is distinct tendency to associate the rarity or abundance of animals with the season. Half of the species, according to the informants, are equally common in the hot or the cold season but the other half occur predominatly

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* 825 during the warm season and are very rare during the cold time of the year. To this second category belong *Axius*, *Microphyrus*, *Petrolistes* and *Leptodius*.

Rhythm

There are no data on this subject among the crustaceans and there is no indication that the Seris believe in any differences in the amount of crustacean activity from daytime to night.

Ecology

Here there is more information because the Seris were able to provide ecological data of some sort for each of the species in the list. They pointed out that each of the species was exclusively a sea-dwelling animal and that the majority of them are associated with the rocky habitat. In fact, not one appears to be a sand dweller. The only exception is the mud-shrimp *Axius*, which animal they say (and in fact it does) lives in deep burrows in mud, some foot and half deep. All except the mud-shrimp and the barnacle live under rocks, the barnacle on the rock or on the marine turtle. All prefer shallow waters although some are also found in deeper waters. They walk under rocks but do not like to wander away and some do not even move much under rocks. The informants indicated that presence of some species in a given locality depends on the presence of suitable rock habitat. In addition to this, they credit *Callinectes* with a particular fondness of the Esteros.

Distribution [1]

Even from the small numbers of species it is clear that once more the general knowledge of the animal distribution is related to the frequency of visitations. The Seris' rare trips to the larger [484] outer islands, San Esteban, San Lorenzo and

[1] [see category 116 - ¶ 65 for distribution chart - Analyst.]

[P.44 A]

#825 [484] Angel de la Guarda or to Guayamas and Punta Peñasco, result in little knowledge of the fauna and habitat, and for such localities they answer usually in a form of a question mark. On the other hand, localities with which they are well familiar, Kino, Desemboque, various places on Tiburon or Isla Patos and the Esteros between Kino and Desemboque, have to them then much greater fauna, and also the informants are able to state reasons why an animal may or may not be present. Again, we have the familiar explanation for the absence of certain creatures from Kino, "too sandy" or "no rocks." The mud-loving *Axius* they say is especially prolific in the muddy esteros of Estero Sargente, and in Tecomate it occurs only in one spot where there is mud. Finally, absence of *Leptodius* from the Isla Patos' shores is due to unusually turbulent waters, an explanation offered also for the absence from that spot of several marine invertebrates.

Anatomy

An interesting idea has been suggested in connection with the identification of the body parts in *Leptodius occidentalis*. (The informants correctly identified the mouth.) They also said that the animal has two eyes, no teeth, two legs and eight arms. The front enlarged legs (pincers) they think are legs, the eight smaller limbs behind them are arms. The reason for this division has been advanced, namely that legs are large and arms are small. This is yet in contrast with the real function.

Dangerous and Toxic

Not one of the crustaceans is considered dangerous or toxic. None have any venom. *Axius* and *Leptodius* bite mildly with their forelegs but do no harm. That is the extent of information I could get.

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IX

MISCELLANEOUS

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Scientific	Common Name
ANNELIDA	
Annelid worm (tube)	
POLYCHAETA	
Eurythoe	Stinging worm
ECHINODERMATA	
Heliaster sp.	Star fish
Holothiurioides	Sea cucumber
Encope grandis	Sand dollar
Echinometra vanbrutti	Regular sea urchin
COELESTERATA	
Anthozoa	Sea-anemone
Medusa	Jelly-fish
PORIFERA	
Porifera	Sponge

128 136 All these miscellaneous animals are grouped together and discussed together simply because only few species from each group are represented and any generalized comments are not reliable.

The following individuals identified the material. Annelid worm (from tube only)—J. E. P. Morrison, U.S. National Museum.

Sea-urchins — Elisabeth Deichman, Harvard University.

Remainder—Borys Malkin

Taxonomy

*825 With an exception of the sponge, all of the forms listed here are considered animals and not plants. The criterion is movement and when questioned for reasons the informants invariably replied "this is an animal because it moves." It applies equally to the jelly-fish and the *Echinoderms*. The *Annelid tubular worm* is also considered an animal and its shell is instantly recognized as an animal shell. This is surely owing to the movement of the worm in and out of the shell, although the worm does not move with the shell, being imbedded on rocks.

[824] The sponge, on the other hand, was said to "stay on rocks for 5-6 years. It does not walk. It is an alga or plant, not an animal. There are several different kinds, different in color." Thus the minutest sort of movement is shown again to be the basic criterion for the distinction between animals and plants.

Sexing

The Seris know nothing about sex differences in these groups. Of course, several of these beasts are hermaphroditic and self-fertilizing, and there are no visible differences. But in any case the informants simply didn't know what the differences between the sexes are.

Food

No knowledge.

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IX

MISCELLANEOUS

Predation

+825 The marine turtle and the *puerco* (but not shark or octopus) are mentioned as predators of the jelly-fish. What is the basis for this statement I do not know.

Development

The usual reply on this subject was "I don't know." One of the informants suggested, however, that the Sun Dollar urchin has eggs. This is pure guess. The urchin has eggs all right, but they are too tiny to be seen with the naked eye.

Seasonality

In contrast to some of the previous categories, a great deal of distinction is made concerning seasonal occurrance of animals. This breaks down as follows:

	species	Number
Hot season only	*Encope grandis, Medusa*	2
More in hot than cold season	*Heliaster*	1
Equally in both	*Porifera, Echinometra, Eurythoe*	3
Cold season only	*Holothuroidea*	1

There are few embellishments on the subject of seasonal distribution. Regular sea urchin, the informants said, is rare in Desemboque in both seasons, while the sea-cucumber is rare in the cold season but altogether absent in the warm season. This last statement is not correct since I found many of them under rocks. It may be related to habits of the animal and its tendency crawl about in the cold season. For the older Seri not interested in scavenging after intertidal animals, they may well have disappeared from sight. Finally, there is a specific idea concerning the presence and absence of the jelly-fish. This beast, they say, first shows up on May 16th and on November 16th, disappears from the shore line waters. It spends the cold season in the deep waters.

Rhythm

Almost no data. However, the informants said that the sea-cucumber and *Heliastes* are "active day and night."

Ecology

Here again, the Indians were able to provide some informantion for each of the species. All of the species listed in this category are lovers of rocky habitat with the exception of the jelly-fish and the sand dollar. Jelly-fish, they say, swims at all times, the sand dollar lives on sandy areas and crawls on sand. The tubular *Annelid worm* they recognize as a rock-lover also, but they say it also likes to attach itself to the shells. And

* 825 surely the specimens which I showed them were collected off *Codaria distinguenda*. On the whole, and with the exception of the jelly-fish, all animals here are inhabitants of the shallow waters—that is intertidal.

Distribution

Again familiarity with the locality increases the detailed knowledge of the distribution of animals and reasons for their absence or presence. Once more in several cases such indications had been made. Once again Porto Kino has some animals present in large numbers (like the sand dollar), or absent altogether (*Anthozoa*, *Eurythoe*, *Helistere*) because of its sandy beaches.

The distribution of the *Encope* and the *Annelid worm* as given in the table[a] is somewhat dubious. The basis for this is a statement that it is "found everywhere except . . . etc . . . ." But the informants who made it lacked good knowledge of many localities and they evidently were in a habit of phrasing the matter in this way.

Anatomy

The sea-anemone and the *Echinometra* are said to have mouths in the center. The *Medusa* has arms but no mouth, eyes and ears. But it does have a stomach. The Anthozoan mouth is in the center but it has no eyes, teeth or arms. The *Echinometra* has mouths in the center and inside the teeth, in the same way as the starfish. The *Polychaete* has no mouth, but it is supposed to have two tiny

[a] [see category 116, p65 - Analyst.]

[P.46A]

+ 825 eyes in front of the body. These are small spots which are different organs but the Seris think they serve as eyes.

Toxic Forms

953
+ 825 This group of miscellaneous marine animals contains, according to the Seris, an unusual number of toxic and dangerous forms. Three are considered as nasty and toxic, the *Medusa*, the stinging worm and the regular sea urchin. The least dangerous of these is the sea urchin. Its spines are "sometimes poisonous. When broken off, they stay in the body and it never heals." The Seris, however, are more fearful of the other two. The *Medusa* "is very venomous and dangerous when touched." "It causes great pain," irritation and swelling" and then "it is not fatal. Just 12-13 hours of illness and then . . .nothing." The stinging worm is equally bad, the Seris say. "It has spines which sting badly. It causes local swelling for 2-3 days. It has much painful venom but is not fatal."

All these comments are based on observation and reflect pretty much the real situation. There is no exaggeration in them.

Miscellaneous

+ 825 Movements of animals had been observed at least in a few cases. The sea-cucumber they say "walks like the viper," leaving marks on sand. The regular sea urchin walks on its spines which are called *xeppe nosymx* or *xeppé*, meaning sea.

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X

INSECTS AND ARACHNOIDS

Scientific

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COLEOPTERA
CINCINDELIDAE
Megacephala
Cicindela carthagena colossus
Cicindela lemniscata
Cicindela californica brevihamata
Cicindela californica mojavi
CARABIDAE
Chlaenius orbus
Calosoma prominens
HISTERIDAE
Saprinus discoidalis
HYDROPHILIDAE
Hydrophilus insularis
ELATERIDAE
Chalcolepidius smaragdinus
Melanotus cribricollis
Horistonotus sp.
MELOIDAE
Meloidae-gen? sp?
CLERIDAE
Cymatodera sp. A.
Cymatodera sp. B.
OEDEMERIDAE
Oxacis sp.
BUPRESTIDAE
Polycesta velasco
Hippomelas sp.
DERMESTIDAE
Dermestes maculatus
TENEBRIONIDAE
Eleodes sp.
Asidina confluens
Cryptoglossa verrucosa
Steriphanus punctatus
Edrotes ventricosus
Glyptotus sp.
SCARABAEIDAE
Trox suberosus
Diplotaxis knausi
Cyclocephala longula
Anoplognatha dowianus
Ligyrus gibbosus
Strategus
Scarabaeidae, gen? sp?
CERAMBYCIDAE
Monilema sp.
Aneflus prolixus
Aneflus
Derobrachus geminatus
Achryson surinamum
Acanthoderus peninsularis
BOSTRYCHIDAE
Apatides fortis
CURCULIONIDAE
Eupagoderes sp.
ORTHOPTERA
Acheta assimilis
Eremopedes bilineatus
Insara covillae
Clematodes larreae
Periplaneta americana
Arenivaga sp. nov.
Anconia integra
Diapheromera calcarata
Stagomantis limbata
Stagomantis californica

HEMIPTERA
Rhytidolomia sayi
Lethocerus delpontei
Rasahus thoracicus
Triatoma rubida
Leptoremus sp.
Reduviidae, gen? sp?
Homalocoris minutus
HOMOPTERA
Deceroprocta sp.
Acanalonia sp.
FULGORIDAE
Scolopsella reticulata
DIPTERA
Erax argyrosoma?
Hermetia sp.
Stratiomyidae
NEUROPTERA
Paranthaclisis hageni
Scotoleon congener
HYMENOPTERA
Chlorion aerarius
Hemisia sp.
Bee
Ptiloglossa mexicana
Dasymutilla klugi
Dasymutilla magna
Photopsis sp.
Pepsis sp.
LEPIDOPTERA
Ascia sevata
Danaus gilippus strigosus
Agraulis vanillae
Amblyscirtes sp.
Phlegethontius sexta?
Sphingidae, gen? sp?
Sphingidae larva
Erebus odora
ARANEIDA
Artema atlanta
Syspira eclectica
Menemerus bivittatus
Latrodectus mactans
Aphonopelma
SCORPIONIDA
Hadrurus hirsutus
SOLPUGIDA
Eremoaz calexicensis
MYRIAPODA
Scolopendra walkini
Orthoporus sp.
ACARINA
Acarina, gen? sp?
IXODOIDERA
Ixodidae, gen? sp?

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X

INSECTS AND ARACHNOIDS

114 Altogether information has been collected concerning 92 species of insects, scorpions, ticks, myriapods and arachnoids.

Economic uses

262 [114] McGee says that "good many insects" are part of the Seri diet, although he does not specify just which they were nor how significant. There is no doubt that in his days, the insects played some role in the Seris' food and that they were probably far more important in the distant past, in the [177] XVIII and early XIX centuries, before large flocks of livestock, horses and cattle of the Spanish rancheros offered excellent opportunities to supplement the usual diet.

Of all this but minor traces remain today. The Seris even have forgotten which insects had been eaten by their ancestors. Apart from the bees, only the Sphingid caterpillar has been indicated as "eaten in the past, but not now." As for the bees, [263] their honey still is part of the Seri diet. But with the availability of sugar, even this addiction dwindles.

* 825 857 Other than this I have been unable to discover any uses whatever, except perhaps as playthings of little boys, with the usual torture in view. The *Cicada* is most significant of these, of which more later.

Pets

231 [171] The only insect pet is a *Cicada*. This insect is usually tied to a long thread, its forewings partly clipped off and then released into the air like a kite. Local Mexicans also provide their own boys with a similar kind of toy.

Hunting

222 Only bees are hunted. They are usually flushed out of the cave shelters in the mountains. The operation is accomplished without the use of smoke. The honey is cut out with a knife.

Taxonomy

* 825 Seris' ideas of association of various insects are very loose. Few insects are recognized to form natural groupings; bees, butterflies, wasps, spiders are most distinct. However, there are all sorts of gradations blending confusedly with each other, often dependent on the knowledge and interest of particular informants.

Simple recognition is not always present. Out of 92 forms, 13 the informants could not identify, simply saying that they didn't know them. *Cicindela lemniscata*, *Melanotus cribricollis*, *Horistonotus*, *Meloid*, *Oxacis*, both species of *Cymatodera*, *Photopis*, *Scolopsella*, tiny Scarab, *Leptoremus*, *Homolocorus*, and *Reduviid*—all these were in the

[P 47 B]

*925 "unknown" category. Reasons for this lack of recognitions were sometimes stated, namely, that the creature was too small. But with some insects, for example *C. lemniscata*, the animals evidently do not occur right at Desemboque and the specimens came from Estero Sargento. Interestingly, the informant could identify other species of tiger beetles without trouble.

On the whole, all these "unkowns" are of small size and most of the recognized insects are medium to large size.

Nomenclature alone is not always the basis for distinction. Occasionally the Seris pointed out that the insects were different, yet they had the same name for them. Here belong the following groupings: *Trox, Eleodes and Asidina; Anoplognatha dunnianus* and *Arenivaga;*-small mantid and the walking stick; *Lethocerus* and *Hydrophilus;* three spiders, *Artema*, *Syspira* and *Menomorus*, all considered identical yet all different from the Black Widow (*Lathrodectus*). One might suppose that various general features suggested differences, in the case of *Eleodes* and *Asidina*, the extreme hairiness of the former. In the three above mentioned species of spiders and the Black Widow, the informants specifically mentioned that "they are different because they do not sting" (referring to the three).

A considerable number of insects the Seris see as identical, even if they really are different animals. A table will indicate the identical pairs or groups.

Achryson surinamensis and *Acanthoderus*
Diapheromera calcarata and *Stagmomantis limbata*
Arenivaga and *Edrodes*
Parathaclisis hageni and *Scotoleon congener*
Diplotaxis knausi and *Eleodes*
Cicindela californica, C. brevihamata and *C. colossus*
Polycesta and *Hippomelas*
Hippomelas, Dermestes and *Steriphanus*
Asidina and *Cryptoglossa*
Cotalpa and *Strategus*
Hydrophilus and *Stratagus*
Menomorus, Artema and *Syspira*
Chlaenius orbus and *Eleodes*
Ascia sevata, Danaus gilippus and *Agraulis vanillae*
Insara covillae and *Eremopedes bilineus*
Arenivaga and *Anoplognatha dunni*
Trox and *Asidina*
Aneflus prolix and *Derobranchus geminatus*

The striking feature at once is the association of closely related animals. In general, the confusion does not arise between different orders. An exception is *Arenivaga*, a small roach, confused with *Eleodes* and *Anoplognatha*. Since the female of the roach is flightless and hides under stones and debris, like *Eleodes*, and is dark in color, the association is not surprising.

Some of these confusions are not easy to explain, for example, that between *Staratgus* and *Hydrophilus*. As I avoided giving the informants clues about the animals. I showed them separately. *Strategus* is a land-dwelling beetle. *Hydrophilus* is an aquatic beetle. Possibly, in their own habitats, the beetles would have been classed as different.

Incipient differentiation had been suggested in some forms. The three butterflies listed above were said to be "the same but only different in color." The smaller tiger beetles, *Cicindela cali-*

* 125 *fornica* and *G. brevihamata*, were described as young of *C. colossae; Glyptotus* as young of *Monilema; Diplotaxis* as young of *Eleodes*. Smaller size in these instances obviously suggested age differences. Both Buprestids, *Polycesta* and *Hippomelas*, the informants suggested, were the same only "different little in size and color." However, why *Hippomelas* should be regarded as identical with *Dermestes* and *Steriphanus*, both much smaller beetles and also from vastly different habitat, is not clear. Finally, I had been told that the *Asidina* and *Cryptoglossa* are merely a female and a male of the same thing but the informants could not tell me which was which. Likewise paired were *Cyclocephala* and *Ligyrus*, both as a female and a male respectively of the same animal.

In *Clematodes* larvae, the Seris insisted they knew the animal but not its name.

In *Apatides fortis* they recognized two kinds, one light chocolate, the other black. But no nomenclatorial distinction was made.

There remain few species which had been obviously confused with something else. Confronted with the specimens and queried about their natural history, the Indians gave the answers obviously fitting another insect altogether. *Cyclocephala* was thus obviously confused with something else, perhaps the scavengering *Dermestid*, as was also *Rosabus*, while *Arenivaga* was confused with the *Triatoma*. Since the aberrant roach, with its apterous, rotund female and its oblong, flying male, had been confused now with one, now with another kind of insect, it only suggests little knowledge on the part of the informants.

Indications of classes of insects:

Erebus and *Protoparce* considered one class—both butterflies
Anophelma—a spider
Solpugid—a distinct creature of own
Striatymyid larva—a creature of own

Only one kind of cricket exists.

Sexing

Information concerning sex has been obtained for slightly half of the insects in the list. Of these, for only 17 species some sort of sex differences were indicated; for the remaining 28, the reply was simply "I don't know." The most obvious suggestion of sexual differences was the size. In 13 species male has been indicated as larger than the female; in no instances was the reverse situation. The species with supposedly larger males are:

Tetracha carolina
Hippomelas
Ligyrus
Anconia
Diapheromera
Mantid (small)
Triatoma
Chlorion
Menomorus
Latrodectens
Hadrurus
Eremorhax
Bee

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*825

It should be pointed out that this concept does not necessarily reflect the real situation. For example in the Black Widow, it is the female who is much larger. Also in some cases, different species are considered males of smaller forms merely because they are larger; thus *Megacephala* is the male of a smaller tiger beetle *Cicindela cartagena*, *Colossus* (interestingly smaller yet species of tiger beetles are believed to be young) and *Ligyrus* as male of *Cyclocephala*.

Presence of bright colors had been indicated as a male characteristic only once; it is asserted that the male Black Widow had red marks, not the female. Dark, somber coloration, usually ascribed to the males, also turned up as a cultural fiction among the insects. This has been indicated as the reason for considering *Ligyrus* a male of *Cyclocephala*. In *Eremorhax*, the male is also supposed to be larger and in the moth *Erebus odora*, the males are supposed to have black stripes on the inner side of the fore-wing.

One more interesting item concerns the bees; bees are said to have chiefs. The chiefs are males and are larger than the common populace, the Seris say. It is dubious that they actually could tell that drones are the males. There is no question that here the cultural fiction once more operates; male *is* larger. Also the drones are less numerous, hence the chiefdom. What relation there is between associating larger size with the chiefdom is not clear at the moment.

In no account, temperamental differences had been uncovered between the sexes. In insects, the Seris fear the Black Widow and the *Triatoma*; both sexes are considered equally dangerous. Likewise no apterous condition has been hinted for the female.

Age

As expected, the Seris have little knowledge of the age of insects. Information concerning this matter has been obtained for 27 species. For 19 of these the answer was "quien sabe" and only for eight, longevity has been indicated. Almost all of these were larger insects, including the Black Widow, Scorpion, the Tarantula hawk, Tarantula, Mantida, Phasmids and a few larger Orthopterans. Almost invariably the answer was six months; only the *Cicada* there had been hesitation and difference of opinion; one informant said four months, others didn't know. In any event, the replies suggest two things; there is the usual standardized answer "six months" and also the insects live only through the hot season. This is because the Seris have no way of finding out which of them actually hibernate.

Development

Information concerning some aspect of the insect development has been obtained for 45 species, with the familiar results. No knowledge at all for 32, some sort of knowledge for only 13, less than 15% of the total.

Of the 13 species, only five are said to be born from eggs. These are four spiders (*Latrodectus*,

[P. 49A]

*825

Syspira, Mesomorus, Tarantula) and the bee. It is certain that the informants observed the egg sacks carried by the spiders. But it is not likely that they have ever noticed bees' eggs. In this instance, a cultural concept must be present.

The remainder are said to be born alive. This includes the tick whose "mother has many young, when born it is very small" and the scorpion, whose mother "carries the little ones in the back." It is interesting that for the *Cicada*, the informants denied presence of eggs although they did not volunteer to say how it developed.

Knowledge of insect metamorphosis is limited and includes only three disconnected isolated cases. The cricket *Acheta* is a moot point; some informants believed that it turns into a larger animal (though they didn't say what); another informant simply didn't know. The *Sphingid* larva "turns into a butterfly in 10 to 20 days if it rains, but if rains fail, it continues in its present state." Finally, in only one species, the blow-fly, the Seris correctly associated maggots and the adults. But this knowledge either came to them from the Spaniards or else it was a matter of easy observation, considering the amount of offal in the village and the number of flies and their progeny. Conversely, the Seris could not tell anything about the *Stristomyid* larva.

Food

The Seris have quite a bit better knowledge of the food habit of insects than of their development. Information obtained for 49 species showed some knowledge for 22, negative responses for the rest. Certain amount of association between a class of insect and its diet is made. The true *Orthopterans* feed on "flowers and some small plants," although the cricket for some reason is not mentioned here. The Mantid feeds on "ants sitting on the mesquite" but they denied it was cannibalistic. Butterflies and some moths either drink water or sweet, (here also Tabanid *Hermetia*) from flowers,[14] but *Erebus* is an exception in that it "drinks only water." Wasps, the Seris observed, are also fond of water and the derivation of the Tarantula killer's name has already been discussed. But *Dasymutilla magra* they think feeds on "soil and flowers." It is not difficult to see why they think it should be geophogous since it perpetually scurries on the ground. Spiders on the whole feed on flies, although the *Tarantula* also takes scorpions and a fruit of *pechitas* (?). Finally, there are blood-sucking insects, *Arenivaga*, *Triatoma* and tick. Of these, ticks and *Triatoma* attack not only dogs but also humans. However, *Arenivagas'* blood sucking propensities are the informants' invention. Perhaps it is confused with an assortment of other forms. At the end there are scavengers; here are listed *Hippomelas*, *Trox*, *Cyclocephala*. Of these, only *Trox* actually is a scavenger. The other two aren't even found anywhere near carcasses. It is interesting in this connection that neither *Demestes* nor *Saprinus* are

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[14] Bees collect sweets from flowers, especially in hot season and make honey for food. This is from four informants.

[P. 49 B]

*825 mentioned as scavengers, yet both habitually are associated with dead animals, even if *Saprinus* is really a predator.

Of course, insects have also enemies. Out of 41 species for which data are available, affirmative replies came for 16; for the remaining 25 the Seris didn't know the answer.

Birds are listed as most frequent lovers of insectivorous diet, but neither birds of prey nor sea-birds are among them. Most of these, one would suppose, are too large to be bothered with the tiny morsels. Lizards are occasional predators and among the animals, as most frequent gourmants of insects, the Seris mentioned badger, coyote, rarely dogs or cats. Not all are equally palatable. Cats, for example, will chew the smaller spiders but eventually will spit them out. Or the habits of the insects provide a good defense. Thus the diurnal butterflies and *Erebus* are free from most enemies because they fly a great deal. Finally, the bee falls victim, they say, to scorpions and spiders, while the cricket only to birds, although it hasn't been explained.

DISTRIBUTION

a) Seasonal

In contrast to the clear recognition of the seasonal fluctation in the occurrance of other animals, Seri ideas concerning insects are on the dim side. This will be clear from the following table:

Hot season only	18
More in hot season	15
Equally both seasons	32
More in cold season	1
Cold season only	0
Total	66

On the other hand it is somewhat impressive that they had been able to volunteer the information on more then 75% of the total number of species.

From the table it is clear that while they distinctly notice the connection between warm weather and the presence of insects, their impressions are not as clear as one would expect. Insects perhaps more than any creatures are associated in the Seriland with the hot season. Yet for 32, more than a third of the total, they indicated no seasonal preference.

By orders, the distinctions are clearer. All species of *Lepidoptera* for which information is available they think turn up during the hot season, including the *Sphingid* caterpillar; same is true of the *Neuroptera*, *Myriapods* and ticks and mites. Most of the *Cerambycid* beetles are also in this category. The remainder, however, are split haphazardly and there is no pattern to their preferences. It is interesting that the only animal which is supposed to show preference for the cold season is *Triatoma* but perhaps the information available is not reliable on this subject.

As expected, at times the informants indicated insects' preference for the rains. *Erepemodes* and *Clematodes* among the *Orthoptera*, *Orthorus* of the Myriapods, the Red mite, both Neuropterans, and the Sphingid larvae—all these they say come

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*825 out during or after rains. The Red mite indeed is a habitual water lover and it does come out after rains in the desert. Actually, probably far greater numbers of insects are associated with the rains, and, of course, there are tremendous flights of insects to the lights following a great downpour but somehow the informants didn't seem to have associated this phenomenon or perhaps the matter eluded my questioning.

In some instances, the Indians indicated where the insects may be found during cold season. *Asica*, *Danaus*, *Agraulis* and *Amblycirtes*, all of them *Lepidoptera*, are supposed to spend their cold season in an inactive state "in the caves in the mountains," a most dubious proposition indeed. The *Hydrophilus* water beetle, on the other hand, "goes underground" for the cold—another invention. Finally the bees are active all year around but their "work" of honey gathering is limited to the hot season.

But what is most important, the scantiness of the insect sample should be kept in mind and any further work may undermine the conclusions suggested here.

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*825 Even more dubious are the conclusions reached concerning the Seris' knowledge of the distribution of insects. Not only the sample represents but a tiny fragment of the Sonoran insect fauna, which even in the impoverished Seriland must number many thousands—at least 3-4,000 for the *Coleoptera* alone, a most conservative estimate. Not only our own knowledge of the existing forms in the area is most limited, but we know even less of their distribution from place to place, from one ecological zone to another. The best that we may do is to guess the probable distribution of some forms on the basis of what we do know of their ecological preferences. As for the remainder, especially the strong fliers, we may assume that they occur everywhere within the area, unless there is special reason to believe otherwise. However, these special preferences, when they are known and exist, are of greater significance in the selection of specialized niches and host rather than in the overall distribution pattern.

*825 The 25 localities in the charts as will be remembered have been selected because they represent either important landmarks or because they represent a specific type of habitat to which different faunal elements are restricted.

An explanation of the chart may not be amiss.[1] Species for which no distribution symbols are indicated are those which the informants simply didn't know. On the other hand, those that show up in practically every square are those which the Seris covered with a blanket statement like "found all over the world . . . " or "found all over the world except in . . ." etc.

From the very first glance at the chart it is obvious that the greatest number of species are ascribed simply to the localties the Indians know best and where they spend most time: Desemboque, Porto Kino, Buena Vista, Tiburon and the mountains back of Desemboque. One would be also tempted to include San Esteban island in this

[1] [see category 116 - pp66-68 - Analyst.]

* 825 list. The number of negative replies is impressive but it is difficult to say whether this is due to the poverty of the fauna or simply the shortness of the Seris' visits. The fauna is undoubtedly impoverished even by comparison with Desemboque but we know really nothing about it.

As will be seen, frequently the informants indicated that such and such species is rare in a given locality or sometimes that it is common. In this they are often correct, since certain forms, for ecological reasons, are more or less common in a particular locality. Some of this will be discussed under ecology.

Rhythm

What had been said of the reasons for incomplete data on insects concerning their geographic distribution may also be said of the present matter. However, the chart will help to analyze the material:

Daytime only	18
More in daytime	1
Equally day and night	25
More at night	8
Night only	11
Total	63

Although data are available for almost 75% of the total number of species, the results are most inconclusive, the breakdown falling almost equally into all three major categories with certain amount of preference for either completely nocturnal or diurnal activity. In fact, considerable number of purely diurnal forms had been described as "nocturnal" and several purely nocturnal forms as "diurnal." In the latter case, several of them are those that spend daytime in hiding under debris, stones or logs, and when disturbed, will show a great spur of agitation trying desperately to hide from the sunlight. This may well suggest to the informants that they are active also in daytime. Only the species that are active at night but go into undiscoverable hiding during the day may appear to them as purely nocturnal.

Group association between the time of activity is rare. It can be detected for the *Lepidoptera*, the diurnal butterflies which are so described. The Tenebronid beetles the Seris seem to regard on the whole as more nocturnal, and this, of course, is perfectly true. *Erebus*, the huge Noctuid moth, belongs here and so does *Amblyscirtes*, the skipper, which, although diurnal, looks enough like a moth to result in confusion. Larger spiders, the Black Widow and the *Tarantula*, are among the night prowlers, according to the Indians, and so—and correctly—is the Soliphugid. But inclusion of the *Pepsis* (the Tarantula hawk) among the dubious is unaccountable.

Sometimes reasons for the preference of an insect for day or night had been indicated. Some, *Hydrophilus*, *Cyclocephala*, *Derobranchus* and *Chalcolepidius*, are all believed to be artificial light and a few more, are not supposed to be attracted very much to light. Others, *Rasahus*, *Lethocerus* and a few more, are not supposed to be attracted to lights when, in fact, they very much are. As for *Chalcolepidius*, the beetle is so very rare that

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* 825 what the informants say about it may be dubious. What is important, though, is the fact that there is far greater number of insects attracted to the lights—immense in fact.

[513] In some cases, the Seris' idea of midday siesta which everybody, the animals included, take, turns up in their entomology. Thus, the *Tarantula* spends mid-day underground. The *Cicada* does not sing during the hot noon hours. *Chlenius* and *Diplotaxis* also rest at midday although really both are very much nocturnal animals anyway. As for the animals inactive during either time of the day, it had been suggested for some that "they sleep," the same motif showing up in the Seri knowledge of other animal groups.

Anatomy

Little information is available concerning Seri knowledge of the insect anatomy. But where inquiry has been made the Indians showed good knowledge of some of the gross morphological traits of the insects. In all species for which the data are available—a dozen altogether—the following are present: six legs, two wings, two horns (antennae), head and mouth parts usually in the front. An exception here for unaccounted reasons is Tettigonid *Erepemodes* which was said to have four legs. Of course, the Myriapods have "many legs."

Biting outfit is variously located. The wasps and the larger spiders (*Tarantula* and Black Widow) will bite with the fore end of the body but will sting with their rear. The Soliphugid (perfectly harmless in fact) "stings" with the rear end of the body while *Scolopendra* will bite like a viper. The Mutillid also stings. Inclusion of the spiders and Soliphugid as "rear stingers" is unexplainable unless their curving movement suggests a wasp to the Seris.

A most peculiar trait is ascribed to *Tetracha carolina*. This beetle, the Seris say, "has two red light spots on the body which are bright red at night like light." In daytime they indicated the two reddish marks on the elytra. Of course, the insect has no luminescence of any kind even though it is most active at night. This suggests that some sort of really luminescent beetle, a Lampyrid or most likely a *Pyrrhophorus*, does occur in the area and is mistaken for *Tetracha*, although the *Pyrrhophorus* lights are green and located up front.

Miscellaneous Behaviour

In general there is a clear cut recognition of which insects can fly and which cannot. Sometimes, however, this does not correspond to the real situation. If the insect is likely to fly off only at night, while during the day it will seek refuge in crevices from the light, *Saprinus*, for example, it is likely to be included among the supposedly apterous forms.

Web makers are only spiders, the smaller species. Of the Salticid, the informants said that "it sits in the web, only descending down the line to grab a victim." This is not exactly true of the

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jumping spiders but it is certainly true of some others that the Seris had an opportunity to observe.

With the exception of the bees, all insects for which information is available had been described as solitary, and quite correctly. As already mentioned, there is little recognition of the parental function, which would eliminate any suggestion of gregariousness.

For the same reason, there seems to be little notion of insect migration. The informants suggested that *Anconia*, the Orthepteran, appears at times in great number and "moves." But it had not been indicated how or where, and this seemed to be the closest I had been able to come to the suggestion of insect migration.

Ecology

Although in very sketchy outlines at times, the informants were able to give some sort of ecological information for 62 out of 92 species, a fair number when we consider that several of the total were among the "unknown." It is difficult to arrive at any consistent classification of the ecological habitats of insects—as seen by the Seris. The data is erratic and incomplete. The most consistent pattern seemed to be absence of insects from the marine beaches. Presence of species after species in this habitat had been denied by all informants. The only exceptions were the tiger beetles, the *Tetracha* and its presumed brood, the smaller species of *Cicindela*. These are supposedly more common on playas near the sea than near the fresh water, an observation not supported necessarily by facts. On the other hand, such creatures as *Hydrophilus* very emphatically had been described as fresh water inhabitants.

Very frequently, the locality for a given species had been explained in ecological terms. Both wasps (*Chorion* and *Pepsis*) and the *Hydrophilus* and *Lothocerus*, the giant bug, are said to be found always near water, a perfectly valid observation. The Red mite and the Millipede *Orthorus* are supposedly inhabitants of wet soils who come out after rains or during rains—an incontestable fact. Also some of the butterflies, notably *Danaus*, are supposed to be found in the vicinity of water which they drink—also a valid observation.

A number of insects are inhabitants of the sandy regions in the Seri view. Here belong the Mutillids and certain of the Tenebrionid beetles, the *Asidina* (which also occasionally comes to the sea beach) and *Eleodes*. In general the Seris observed that the Tenebrionid beetles prefer sandy to the rocky ground and in a way they connect this with their digging habit.

Another loose association of some forms with the habitat is with the millpas and arroyos—the richer vegetation. Some of the Orthopterans, particularly *Clematodes*, and small mantid and the Sphingid larva belong to this group—and in other ways the Indians connect this with the presence of water.

Finally, there are forms living under the debris; *Saprinus* is one of them. The tick is another;

+ 825 it is said to live "in refuse, fish and fish offal and only in the fishing camp." This is one that one must reconcile with the Seris' simultaneous belief that it is parasitic on dogs and that it sucks human blood as well. More difficulty here creates their belief that it is found only in the camp but that the dogs on Tiburon are free from it.

The Phasmids interestingly are associated with trees and sticks, a very correct notion and the Mantids also with the trees.

However, the information is incomplete and apart from the few cases cited above usually contradictory and hazy.

Toxic Insects

Only 19 species out of 92, or little more than 20% of the total, are considered toxic in anyway. Unlike in most of the other phases of the Seri knowledge of the natural history of insects, the natural groupings are quite clear. The three main groups the Seris consider toxic or harmful are the Arachnids, the Arachnoids (*Acarina* included) and the *Hymenoptera*, all very much as one would expect. In addition few beetles and bugs complement the list of the dangerous creatures. tures.

Among the *Hymonoptera* are all of the species listed, with the exception of the bee. This may be due to the fact that the bee in the Seri country is the stingless Melipoind (?). Of the toxic kind, *Pepsis* (the Tarantula hawk) is probably most feared. The sting the Seris think is very painful but disappears after a few minutes as it contains [752] little venom. A plant is applied to the bite and also taken internally with hot water. The *Pepsis* must be really feared because the informants assured [857] me it was one insect the children preferred not to play with—an excellent confirmation of the caution. *Chlorion aeriatus*, the Sphecid wasp, induces [752] similar symptoms by its sting. Here as a cure, Vic's mentholate tablets were said to be used, smeared on the injured spot. This cure is also [177] applied by the Mexicans and the Seris probably adopted it from them. The sting of this wasp is [753] considered more dangerous to children than to adults. The Velvet wasps[15] (Multillids) are also supposed to sting with the rear of the body causing some pain. Finally the *Hemisia*, and Anthrophorid bee inflict a good bite but otherwise are harmless.

Arachnids on the whole are more feared than the *Hymenoptera* and include what the Seris believe to be the most dangerous of all terrestrial arthropods, with a very good justification. The effects of the damage inflicted by these creatures is more lasting and overpowering. The Black Widow easily takes first place and is feared as much as the gecko or the rattler. Some Seris even claim it is the most dangerous of all creatures. It [753] may cause death, they say, although usually one can do with a 2-3 day illness. However, to small children the bite (or as they say "sting" owing

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[15] *Ptiloglossa mexicana* causes swelling and much pain lasting 2-3 hours and is considered most unpleasant of all Hymenopterans.

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* 825 to the belief that the spider stings with the rear
[753] of the body) may cause death in 2-3 hours. It may
also kill chicks and one of the informants, Jose
Juan Moreno, claimed to have been paralized by
the sting of the Black Widow for eight days . . . .
[158] However, Juan is a good hypochondriac, and even
when not apt to exaggerate, he may have suffered
a genuine trauma owing to an encounter with this
spider. While smaller spiders are not considered
too dangerous, the *Tarantula* is. It can both bite
with its jaws and sting with the rear end of the
[753] body and it is said to be more dangerous to children—it
may cause their death at times. The adults
will weather its attack but will become quite ill.
[752] As remedy for its bite, a plant *quivira* is used as a
hot extract taken in a small glass for 2-3 days.

Almost all of the animals closely related to the
Arachnoids, the scorpion, the Sun spider, *Scolopendra*
and the tick, are also venomous in the Seri
view. Of these, the scorpion is most feared, and
in adults it will cause illness lasting up to a week
while to very small children it may be fatal. As a
proof the informants mentioned a six months old
[165] girl recently stung by a scorpion who died in less
than six hours—the fact confirmed by the Mexicans
in the village. Remedy for this is similar to
[752] others—a plant called *amx.xuháy* is drank with
hot water for three days, a glass per day.

The Sun spider, also armed supposedly with a
sting at its rear, is said to be fatal to horses for
whom there is no remedy. This is a pure fiction,
[177] but the belief is common among the Mexicans and
the Seris certainly took it up from them. But no
one suggested that the Sun spiders are in any way
harmful to men although they are avoided, just
in case.

The *Scolopendra* is considered very dangerous, much like a viper. It bites badly but is not fatal. Actually, the story probably concerns another species, for *Scolopendra malkini* has only recently been described and is rare in Desemboque.

The tick's unpleasant traits had already been
discussed under another heading. All that is essential
to add is a belief that in addition to other
[753] exploits it can enter a person's ear causing much
pain and that for this reason it is particularly bad
for the children, as there is no remedy.

There remain three more species of various degree
of toxicity. Of these, the *Triatoma* is most
conspicuous both for its effects and factual observation.
This blood sucker bites with its mouth parts
[753] and introduces illness called by the Seri *syexhis.
ʔe . kemep* which may end fatally. People of all
sexes and ages are subject to it equally, and the
illness may last three months, and there is no

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* 825 [753] [164] known remedy. This bug is actually a vector of the Chagas disease. Its repeated bites may cause allergic sensitization. For lack of clinical observation it is impossible to determine the exact nature of its effects, as the Seris describe them.

The remaining two creatures are both beetles. *Calosoma* is thought a nuisance rather than a danger. Its disagreeable habit is spitting out poison through the rear end of the body which may [753] cause headache for a brief while. To this I may readily attest having on more than one occasion be subjected to *Calosoma's* bombardment. However, at worst it is a mere irritant. Finally *Hippomelas*, sometimes confused with the *Steriphanus* and *Dermestes* are supposedly evil smelling but not harmful.

Finally the male *Arenivaga*, considered separate from the female, the Seris claim also bites with the mouth but it is not dangerous.

What is little surprising is that the Seris did not include in their list a few other insects that could have readily found their way into the "dangerous" gallery. The huge water bug *Leptocerus* of course bites, although the Seris claim it does not. An aquatic insect par excellence, it simply never had a chance to prove to them what it can do. The Pentatomid bug *Rhytidolomia* at least may be included among the stinging variety, although it is perfectly harmless. Finally there are various Reduviid bugs, notorious carnivores, which when disturbed and offered an opportunity will sting painfully. But here again, the Seris may not have played enough with them to find out.

On the whole, the Seris are well informed concerning possible dangers from various insects. As a matter of practical application, they do in this regard far better than the Mexicans.[16]

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278 [16] The Seris may have used a concoction of insects in arrow poisoning. McGee quotes Hardy who had visited them in 1825 as follows:

> "It is believed that the Ceres Indians have discovered a method of poisoning their arrows and that they do in that way: They kill a cow and take from it its liver. They then collect a number of rattlesnakes, scorpions, centipedes and tarantulas, which they confine in a hole with the liver. The next process is then to beat them with the sticks in order to enrage them, and being thus infuriated, they fasten their fangs and exhaust their venom upon each other and upon the liver. When the hole mass is in high state of corruption, the old women take the arrows and pass the point through it. They are then allowed to dry in the shade and it is said that the wound inflicted by them will prove fatal. Others again say that the poison is obtained from the juice of the yerba de fle'cha (arrow wort)."

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XI

SUMMARY

* 825 In 1956 (Malkin 1956:74) I published tables [114] indicating the degree of economic exploitation of the animal world by the Seris. These tables were incomplete and also need corrections. Therefore below I am reproducing the revised version.

Class	Species Reported	Species Exploited	Percentage
Mammalia	21	9	40
Birds	24	6	25
Reptiles and Amphibia	25	17	68
Fishes	44	23	52
Mollusca	37	27	70
Crustacea	10	2	20
Insects	92	—	—
Miscellaneous	9	—	—
Totals	262	82	30

These figures show as yet remarkable degree of exploitation of the products of the sea and also of the reptiles with correspondingly lesser interest in the terrestrial animals in general. Of course, mere listing of animals does not tell the whole story. In the first place, it does not indicate the changes that took place nor does it suggest the relative importance of any group or species. Historically, the situation is different now. Out of nine 262 species of mammals reported as eaten only six still figure out in the diet. The reduction is even more 177 striking in birds where only three are admittedly eaten and two of these only furtively. More yet, only 12 species of marine molluscs out of 27 are eaten while the rest get discarded. All this is tied up then with the changes in the economy, with the importation and increase of the trade foods and goods and also with increasing preoccupation with the commercial fishing at the expense of hunting and gathering.

262 Individually, by far the most important in the Seri diet and economy are the fishes with half a dozen large commercially lucrative species leading the list. Next come the marine turtles and following these for the third place tie the molluscs, the mammals (lagomorphs, bighorn and peccary) and probably the rest of the reptiles of which the rattlers are probably most important by volume. Insects do not figure any longer in the Seri economy in any way, although at one time they probably had some significance. On the other hand, while the food importance of the molluscs de- [439] creased immensely, their trade importance is on the upswing owing to the demand from the outside. Thus the basic changes in the Seri patterns [177] of exploitation of animals has been a result largely of an outside stimulus.

Fishing and Hunting

226 Fishing is practiced mostly to satisfy the immediate needs, of petty cash and food. Once these 185 are satisfied, there is no incentive to fish until the need arises again.

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XI

SUMMARY

224 Hunting is very decidedly secondary to fishing, although it is still much practiced by certain individuals and in a desultory way probably by all.

462 There is a clean cut division of labor in all these occupations. Fishing and hunting are men's occupations, gathering of the desert animals and beachcombing for the intertidal animals is largely the job of women and children. Boys get broken [868] into men's occupations in adolescence, girls into women's jobs very much earlier.

224 Avoidance of fishing or hunting certain creatures appears much more a matter of custom than of well defined and socially rationalized attitude. Frequently an animal is not hunted simply because the Seri feel it is too big and too strong for them to tackle.

157 Through all these activities, Seri individualism is curiously woven and accounts for the failure of anything that might resemble a collective effort.

Food Preferences and Preparation

252 Seri food is prepared in a simplest sort of way. Boiling in water is usual with salt and sometimes [263] a few other spices added. While most food is prepared that way, snakes and fishes are usually fried, without any ingredients. There has been a [178] notable shift toward greater fanciness in the ingredients, as they have become more readily available.

262 There are many preferences. Animals are scaled in desirability. Some fishes, marine turtles, chuckawalla, deer and peccary and duck are at the top of the list; lower animals, smaller fishes including puerco in the middle, while the sea gull and the pelican are probably at the very bottom of the pit. This again reflects temporal changes in tastes [178] although not necessarily a direct influence from the Mexicans.

Pets

231 Few pets are kept, other than dogs. Such animals as come are those captured accidentally. In most cases they are bird nestlings.

Taxonomy

* 825 Differential criteria are applied in the classification of different groups. There is less tendency to group birds than to group different mammals and classificatory ideas break down almost completely in smaller animals, especially insects and molluscs. Considering the economic importance of the molluscs, poor ability to distinguish the Gastropods from the Pelecypods is striking.

The classificatory criteria differ for different groups. Mammals are generally recognized by the furiness, birds by the ability to fly and the pres-

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*825 ence of feather. Uncertainty about the bat then is significant, considering the combination of traits. Other criteria may also be employed. Crabs are distinguished from some of the other marine crustaceans by their hairiness. Differences among the insects are suggested by general shape, hairiness and habitat although also certain features of behaviour sometimes suggested affinity.

Distinctions made within the groups coincide on the whole with the natural groupings, at least for the more conspicuous forms. Hence, comes the breakdown of fishes into two major categories: fishes proper on one hand, and mantas and sharks on the other, snakes and lizards among the reptiles and mammals proper and Cetaceans among the mammals. In a way the Seris' greatest talents appear to be in their ability to recognize the reptilians and amphibians. Here they confused only two species: the two small inconspicuous Utas.

[182] As for the ability to identify an animal, it is directly related to its economic importance and relative degree of frequency in the territory, as one may well expect.

[824] A movement represents the basic difference between animals and plants to the Seris. This is why a sponge is considered a plant while sessile molluscs are animals.

Sexing

Three tendencies distinguishing sexes run through the entire gamut of the animal forms, through all the classes except in the birds: the males are larger, darker and more brightly colored than are the females. These tendencies the Seris may combine in different ways. In the reptiles it is color pattern rather than size that suggests to them the male animal and while the male snakes tend to be darker than the females, in the lizards they tended to indicate the prevalence of the bright color in the males.

Then also in several groups very specific diagnostic traits are employed, as a rule in form of all sorts of extra appendages which are supposed to decorate the males. This is interesting, because it suggests the presence of such extra structures in the males rather than in the females, and, as has been seen from the text, these structures are often attributed to the males regardless of whether or not they really exist in them. The femoral ridge in the male lizards is an especially good illustration of this principle.

[182] There is also a suggestion that in one instance at least the Seris transpose their own social situation on the animals. The bees they claim have "chiefs" and these "chiefs" are males and they are also larger. Here socio-anthropomorphic interpretation is very clear.

But as indicated in the text, the sexing criteria differ often in different groups and it is only fair to show that birds represent an exception to the three major tendencies. The birds have sexes all right but the Seris cannot tell them apart. This requires no further commentary if we reflect why the Seris must think that way.

[182] Finally, there is one more interesting point:

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* 825 [182] [562] no temperamental differences between the sexes can be detected which would only suggest that here the Seris do not introduce the interpretations from their own social situations, because they do have very clear cut ideas of the temperamental differences between men and women.

Age

Here aboriginal knowledge is virtually non-existant nor have the Seris made much effort to try a guess. There are hints that sometimes they associate the length of life of smaller animals with the season, obviously because these disappear for the cold season. Another feeble tendency was for the older informants to suggest greater longevity of an animal than it was customary for the younger informants. Finally, what little knowledge there was, it was still perceptibly greater for the reptiles than for almost any other class and this is quite in line with the general state and complexity of the Seri knowledge of the natural history of these creatures.

Size and Weight

[182] Here occupational influences are overwhelming. The weight of fishes and mammals was on the whole correctly estimated — this associated with the economic importance of these animals. Same features in the reptiles came out only so-so on the general scale and here, surprisingly, not too well on the economically important marine turtles. A rule of thumb is applied (usually incorrectly anyway) to the birds while the remainder of animal groups is covered by gross ignorance and disinterest in this respect.

Development

In general Seri knowledge of the mammalian development is far ahead of the rest of the animals and progressively becomes more and more obscure with the decrease in size. Within this range, specific ideas differ and often are associated with the particular group of mammals. One classic example is fishes which they divide into the viviporous and oviporous with sharks and mantas in the first category and the rest of the fishes in the second. The distinctions between the egg laying animals and those that are born alive run pretty much through the entire kingdom. Insects are the sole exception here but this is largely because of the lamentable lack of knowledge by comparison with the other animals.

Sequential development generally also runs through all of the groups. The belief in the time sequences is so striking that it covers even such groups as the fishes, for here the details of the mating sequences are not understood and, according to the Seris, there **must** be a time lag between mating and the delivery of the eggs by the female. At other times, such sequences are expressed in another sort of cultural fiction. I have in mind the birds where one month each elapses between the delivery of the eggs, hatching out of the young and the flight of the nestlings.

Knowledge of the young litters or the number of eggs laid by the birds or the oviporous reptiles

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*825 [857] on the other hand usually falls very close to what happens in the natural situation. Here cultural factors enter: the Seri boys habit of collecting eggs.

In general, in association with the development, the insignificance or complete absence of the male's parental function is well recognized. Only in the birds and mammals occasionally male's interest in the young had been indicated but even that rarely.

Food

In this field the Seris' knowledge is much better than their knowledge of the development. Herbivores and carnivores are usually quite correctly identified, at least for the majority of the animal groups. Crustaceans they think are largely scavengers—with great degree of accuracy. Predators and their victoms are as a rule scaled down according to the size. Some animals are considered relatively or completely free from predation and when this is so, reasons were usually stated in terms of some peculiarity of structure, size or behaviour. Power of flight figures strongly in this, because only a few birds, they thought, are subject to predation.

DISTRIBUTION

a) Geographical

[182] Knowledge of the geographical distribution of animals as expected is a function of the acquaintance with the particular area or locality and of the frequency of visits to them. It also indicates strong association with the ecology of the habitat, with such features as presence or absence of sand, rocks, types of bottom in waters and so forth. On the relative scale, once more the mammals are best known, insects least.

b) Seasonal

General suggestion of the greater number of species occurring in the hot than in the rainy season runs through all classes of animals. But while in most. birds included, the suggestion is only slightly in favor of the hot season, for the reptiles and amphibia it is overwhelmingly in favor of the summer. Oddly, there is no such clear cut association between the presence of insects and season except for few select groups. The *Lepidoptera* and *Neuroptera* are, according to the Seris, largely creatures of warmth. while the *Orthoptera* are of the rains. In general this short of knowledge is quite conspicuous.

c) Ecological

Here the Seris excell and this knowledge of habitats of a very large number of animals is considerable and perhaps more solid than any other feature of the natural history. In species after species, in all groups, habitat preferences were stated (and correctly). It is interesting that the detailed information here was available for practically all listed species of birds, molluscs and fishes. Great deal of information was also pro-

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*825 vided for other creatures and even 2/3 of the insects. This indicates on one hand the connection [182] between this type of knowledge and economic activity of the adults and on the other hand be- [857] tween the Seri boys' habit to collect and play with all sorts of animals from very early age. This [193] knowledge of the habitats sometimes is even reflected in the aboriginal name of the animal such as for example the use of suffix or prefix *ax* meaning water in several forms associated with water.

Migrations

In contrast to the ecological distribution, knowledge of animals' migrations stands somewhere very near the very bottom in the richness, detail and accuracy. There is but bare suggestion of migration among the mammals and birds and where it does exist among the latter it curiously includes all three overwintering species. This is in contrast to this lack of knowledge or perhaps interest (or both) of migrations of all other animals, Seris' knowledge of the fish migration is much richer. Here at least there is a distinction between the migrating numbers and the size of fish: large fishes migrating supposedly singly, little ones in "millions."

Rhythmic Activity

Rhythmic differentiation is interesting because it clearly divides animals into the nocturnal, diurnal or those that are active in day and at night and because there is a clear association by the groups. Thus all marine animals are considered as both diurnal and nocturnal. But there are also differences in the relative degree of knowledge of different classes. While reptiles, amphibians and mammals stand at the top, the knowledge of this type of behaviour in birds is very fragmentary and in the insects scant and inconclusive, while for the molluscs non-existent.

In this respect, the reptiles probably are most clearly defined and best known.

There is also a clear recognition of the existence of the noon siesta or at least of slowing up of the animal activity. But this applies to the terrestrial animals and there is no suggestion of the siesta for the inhabitants of the sea.

Toxicity

At the apex of toxicity as a group stand unquestionably reptiles and amphibians, with the insects coming next and the marine animals which I loosely brought together under the heading of "miscellaneous" a poor third. Of the reptiles and amphibians 11 species are considered toxic, in various degrees and another seven as dangerous, 44 and 28% respectively, making the total an impressive 72% of all reported species. Among the insects about 20% are considered dangerous and fewer yet toxic; among the mammals fewer yet, with the bat only listed among the toxic forms and that on a disputed evidence; among the birds the eagle as the only dangerous beast and that admittedly on the hearsay; and finally among the molluscs none at all.

The fact is that only rarely these ideas were amiss and only few forms are believed dangerous

*825 or toxic contrary to their genuine nature. When such contrasts exist, the beliefs cannot always be explained as a matter of the influence from the Mexican folklore. The reasons for this I discussed in the chapter on the reptiles and amphibians. The explanation for such beliefs depends mostly on additional field work. It is also interesting that in some of these instances (bat for example) there is a suggestion that the belief in the toxicity or other unpleasant traits not only is not associated with the Mexican folklore but is basically aboriginal, and it is on the way out among the younger men. [178]

Attitudes

*825 182 With rare exceptions Seri attitudes toward animals are remarkably sober, pragmatic and matter of fact. This is evident in how little folklore or irrational fear is connected with the animals. It all runs pretty much along the line of their generalized attitudes, world view and religion as suggested by other investigators (Kroeber 1930:4; This is also the opinion of Spicer, personal communication). Elements of mystery are almost completely absent and this is probably not entirely due to the disintegration of their religion and culture as Kroeber (*Ibid*) thinks. [114]

*825 171 In other ways, their attitude toward animals ranges from indifference (adults) to downright deliberate cruelty (little boys). In this, the Seri boys differ markedly from the boys of some of the other groups I studied (Malkin 1958:89).

[P. 57 A]

Conclusions

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From the presented evidence it is clear that Seri knowledge of the natural history of animals is disharmonic, that some animal groups are better known than others and also that there are great qualitative and quantitative differences in the degree of the knowledge of the special features of natural history within the groups.

Both cultural and environmental factors account for these differences. On one hand, the knowledge is related to the Seri boys' interest in the animals and to the adult's preoccupation with the economically important species. The direction of the change runs from the first to the second but in the final shakedown it is the gross economy that is more important. On the other hand, environmental factors, such as animals' behaviour, habits, and structure and most of all climate and generalized ecology influence and set the limits to the exploration of natural history by the aborigines. But careful distinction must be made in assessment of which factors and when are of dominant importance. It is never an none-or-all proposition.

Finally, there are temporal changes, related mostly to the shifts in the economy and these figure importantly in some of the features in our data.

It is true, that much of this can be only feebly hinted at from the Seri data alone. It is my conviction that all these things can be brought into much stronger relief only through series of comparative studies. Fortunately, a beginning stab in that direction has already been made (Malkin 1958).

[P.57 B]

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APPENDIX: DISTRIBUTION CHARTS

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MAMMALS [1]

	Punta Peñasco	Porto Libertad	Desemboque	Estero de Sargente	Campo Vivero	Porto Kino	Guaymas	Tepopa	Coast of B. C.	Tiburon	Tecomate	Mts. of Tiburon	Infernillo	Patos Isl.	Rasa Isl.	San Esteban Isl.	San Lorenzo Isl.	Angel de la Guarda	Desemboque (mountains)	Tepopa (mountains)	Buena Vista	San Francisco	Hermosillo
Rat			c	x		x				c		x				x					?		x
Jaguar									x	-	-	-	-	-	.	-	-	-					
Cougar			-	-		x-		-		-						-		?	x		x	?	?
x Jaguarundi																							
Ring tail cat											x												?
Badger			x	-		x				-	-	-	-	-							?		?
Skunk	x	x	r	-	x	x	x			x	x	x	x	-		-	-	-			?		x
Fox	x	x	x	-		x	x	x	x	x	x	x	x	-		-	-	-	x	x	?		x
Coyote			x	x	x	x		x		x	x		x			-		x	x	x	x		x
Sea Lion	x	x	-[1]	-	-		x		x[2]	-	-	-		x		x	x	c					
Peccary			x	x		x		-	?	-							-		x		x	?	x
x Porcupine			x[3]			r		r		-						-							?
Cotton tail	x	x	x	-	x	x	x	x		-	-	-	-	-	-	-	-	-	-	-	?		x
Jackrabbit	x		x	-	x		x			x	x	x		-		-	-	-			?		x
Kangaroo rat	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	?
Deer			x	-		-			?	-	-	-	-	-	-	-	-	-	x		x		x
Bighorn			-	-		x[4]	-			-	-	-	-	-	-	-	-	-	x	x			-
Gray whale			x[5]							x[5]							c[6]	c[6]					
Killer whale ?																							
Dolphin ?																							

r-rare
c-common
x-present
- absent
?-don't know
1-because no rocks
2-at St. Louis
3-on level ground
4-big mountains near Kino
5-and all coastal waters
6-deeper waters, esp. near Esteban
7-in deeper waters but in hot season comes near shore

BIRDS 1

	Punta Peñasco	Porto Libertad	Desemboque	Estero de Sargente	Campo Vivero	Porto Kino	Guaymas	Tepopa	Coast of B. C.	Tiburon	Tecomate	Mts. of Tiburon	Infernillo	Patos Isl.	Rasa Isl.	San Esteban Isl.	San Lorenzo Isl.	Angel de la Guarda	Desemboque (mountains)	Tepopa (mountains)	Buena Vista	San Francisco	Hermosillo
White pelican				x		x									n								
Brown pelican	x	x		x	x	x	x	x	x	x	x		x	x	n	x	x	x					
Cormorant 1)	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x					
Frigate bird			x																				
Egret		x	x	x		x							x	r		x	vr	x					
Bittern				x																			
Ibis 2)			-	x		x?																	
Duck														x									
Turkey vulture	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Black vulture 3)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
(Golden) Eagle																							
Osprey	?	?	x	x	x	x	?			x				x			x	x					
Quail																							
Curlew 4)																							
Sand-piper 5)																							
Willet																							
Sea gull	x	x	x	x	x	x	x	x	x	x	x	x	x	n	n	n	x	x	x	x	x	x	x
Dove	?	?	x	-	x	x	?			x	x	-	x	-	-	-	-	-	-				x
Road-runner																							

n-nesting
r-rare
vr-very rare

6)- all mainland plus as indicated
2)- also other esteros
3)- nesting?
1)- also everywhere along the coast
4)- along sea-shore-unspecifiec
5)- as above

[P.61]
[P.60 is blank]

[1] [these Distribution Charts show the distribution of animals in the Seri environment as conceived by the Seris. - See Cat. 116, p 13 B - Analyst.]

9: Malkin E-5 (1953-1955) 1962 NU31 Seri NU31

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BIRDS II

	Punta Peñasco	Porto Libertad	Desemboque	Estero de Sargento	Campo Vivora	Porto Kino	Guaymas	Topopo	Coast of B. C.	Tiburon	Tecomate	Infernillo	Mte. of Tiburon	Patos Isl.	Raza Isl.	San Esteban Isl.	San Lorenzo Isl.	Angel de la Guarda	Desemboque (mountains)	Topopa (mountains)	Buena Vista	San Francisco	Hermosillo
Barn owl			x											x	x	x	x	x					
Hummingbird	?	?	x	-	x	x	?	x		x			-	-	-	x	x	x	x				
Woodpecker		x	x		x	?				x	x	-	-	-	-	-	-	?	1				
Swallow																							
Raven			x	x	x		x			x	x	x		-		x	x	?	?				

REPTILES I

	Punta Peñasco	Porto Libertad	Desemboque	Estero Sargento	Campo Vivora	Porto Kino	Guaymas	Topopo	Coast of B. C.	Tiburon	Tecomate	Infernillo	Mte. of Tiburon	Patos Isl.	Raza Isl.	San Esteban Isl.	San Lorenzo Isl.	Angel de la Guarda	Desemboque (mountains)	Topopa (mountains)	Buena Vista	San Francisco	Hermosillo	Nogales
Horned toad			x	-	x	x				x				-		-			-		x	x	?	
Gridiron-tailed liz.			x	x		x				x						x			x				x	x
Leopard lizard			x	-		x				x	-			-		-			-				x	
Spotted race runner	?	-	x	?	x	x	?			x	x	x	x	-	?	-	?	?	x					
Race runner		x	x		-	x					x			-		-x		x	x					
Northern chuckawalla	?	?	x	x	-	-	?			x	x	x		-		-	-	-						
Chuckawalla																x	x	x						
Northern crested liz.		-	-	-		-	-			-	-			-		x	x	x	-		x	x	-	
Gila monster		x	x	?	-x	x	?			-	-			-		?		?	x		?	?	?	
Uta 2)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Striped ground uta	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Fence lizard		x	x	-	x	x				x				-		x		x			x	x		
Ground gecko		?	r	x	x	x	?			x	x			-		?	?	?			?	?	?	
Night lizard		?	r	-	x	x	?			x	x			-		-	-	-			?	?	?	
Side winder		?	x	x		x				x				-		x		x	x		x		x	
Western diamondback 2)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Coral snake	?	?	r	-	x	x	?			x	x	x	-	-		-	-	-	x				x	
Red racer		-	x	x		x				x				-		-x		x			x			

1)-mountains back of Desemboque
2)-"found everywhere"
r -rare
c -common

REPTILES II

	Punta Peñasco	Porto Libertad	Desemboque	Estero Sargento	Campo Vivora	Porto Kino	Guaymas	Topopo	Coast of B. C.	Tiburon	Tecomate	Infernillo	Mte. of Tiburon	Patos Isl.	Raza Isl.	San Esteban Isl.	San Lorenzo Isl.	Angel de la Guarda	Desemboque (mountains)	Topopa (mountains)	Buena Vista	San Francisco	Hermosillo
Black whipsnake			c	-		?				-						-	?		-1		x		?
Patch nose snake 2)			x	-		x				x						-?	?	?					?
Lyre snake	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Desert tortoise	?	x	x	-	r-	x-	x			x	x	x	x	-		-	-	-	x		x		x
Desert toad		x	x		-	x				x	x		x	-									

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9: Malkin E-5 (1953-1955) 1962 NU31 Seri NU31

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FISHES I

	Punta Peñasco	Porto Libertad	Desemboque	Estero Sargento	Campo Vivora	Porto Kino	Guaymas	Topopo	Coast of B. C.	Tiburon	Tecomate	Patos Isl.	Raza Isl.	San Estaban	San Lorenzo	Angel de la Guarda	Infernillo
Pescara	x	x	x[1]	x	-	x				-	-	x		x	?		
Moro			x	x	-	x	x			x[2]	-	x		?	?		
Pinto	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Sardinera		x	r	r						c	x	x					
Raya		x	x	x	x	x	x			x	x	x		x			
Totuava a)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Cochi	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Sardina		a	a^{1}			x											
Corvina		x	x	x	x	x	x			x	x	-		-			
Anchoveta		x	r	c	x	x	x			x	x	-		-	-	-	
Lisa		x	x	x	x	x	x			x	x	-		-		x[4]	
Palometa		x	x	x	-	x	x			x	x	x		?	?	x	x
Chano		x	x	-	-	x	x			x	x	x		-?		?	
Hypsoblennius		x	c	x		-				x		-		-		?	
Lenguado	?	x	x	x	x	c	?			x	x	-		-	-[5]	-[5]	x
Morena	x	x	r	x	-	-	x			x	x	x		x	x	x	x
Myrichthys tigrinus	?	?	r	x	x	x	?			x	x	-	?	-		?	x
Sphoeroides annulatus		x	c	x	c	x	?			x	x			?	?		

1)-few
2)-near Alcatraz Mts.
r -rare
c -common
a -everywhere in winter, none in summer
a^{1}-rare in summer
4)-here largest of its kind
5)-too rocky

FISHES II

	Punta Peñasco	Porto Libertad	Desemboque	Estero Sargento	Campo Vivora	Porto Kino	Guaymas	Topopo	Coast of B. C.	Tiburon	Tecomate	Patos Isl.	Raza Isl.	San Estaban	San Lorenzo	Angel de la Guarda	Infernillo
Gillichthys seta		x	x	x		-				x	x	x		?	?		
Scorpaena sonorae		x	x	x		-				x				x	?		
Malacoctenus sonifer		x	x							x				x	?		
Ogilbia sp.																	
Lutjanus argentiventris																	
Paroques viola		x	x	x	-	-	?			x	x	x		x	?		
Tuna	found south in the ocean																
Flying fish	in the ocean (seaway)																
Sting ray			x														
Horned manta		x	r	x	x	x	x			x	x	x		x	?	?	
Coronado	everywhere but stays away from banks																
Pieturera	as above																
Gato	everywhere in deep waters																
Dogfish	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Chato	in all deep waters																
Campoco	in all deep waters																
Aptox	as above																
E--p?pax (?)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

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FISHES III

	Punta Peñasco	Porto Libertad	Desemboque	Estero Sargento	Campo Viviera	Porto Kino	Guaymas	Topopo	Coast of B. C.	Tiburon	Tecomate	Patos Isl.	Mesa Isl.	San Esteban	San Lorenzo	Angel de la Guarda	Infernillo
Anisotremus davidsoni		x	c	c	-	-	?			x	x	x		?4)			
Girella simplicidens		x	x	x	r	-	?			x	x	x		x			
Caesodon aenifer																	
Abudefduf saxatilis		x	r	x	-	-				x	x	x		?	?		
Cotylis pinniger		x	c	x	-	-	?			x	x	-		x		?	
Paralabrax maculatofasc.		x	c	x	x	-	?			x	x	x		-			

MOLLUSCS I

	Punta Peñasco	Porto Libertad	Desemboque	Estero de Sargento	Campo Viviera	Porto Kino	Guaymas	Topopo	Coast of B. C.	Tiburon	Tecomate	Infernillo	Patos Isl.	Rasa Isl.	Sar Esteban	San Lorenzo	Angel de la Guarda
Octopus bimaculatus		r	r	c	r	ⓑ	?			c	c		●		?		?
Tectibranchiata		x	c	?	?	●				?	?				?		
Ischnochiton magdalenensis	?	x	x	x	x	●				x	x	x	x	?	x	?	?
Ischnochiton laevigatus	?	x	x	x	x	-				x	x	x	x	?	x	?	?
Codakia distinguenda 1)	x	x	r	x	x	x	x	x	x	x	x	x	x	x	-	x	x
Pelliricum recluziana			x	x	x	x	?			x	x	x					
Phallium abbreviatum	?	x	x	x	x	x	?				x	x	x		-	x	?
Phyllonotus erythrostomus			x	-	x						c			-	-	-	?
Chlamys subnodosa		x				?				x	x	x					
Atrina maura	-	r	c	c	c	-				c	●	x	-	-	-		
Laevicardium elatum		x	r	x	x	x				x	●			-	-		
Chione californiensis	?	x	x	Cox		x	?			x	-	x	x		x		?
Navicula pacifica	x	r	-	x	-					r	-	-	-	-	-	?	?
Turritella broderipiana	?	x	c	x		Cox				x	-	x	-		-	?	?
Crucibulum spinosum			x	x	x	?	?			x	x		x		?		
Cardium consors			x			●							?		-	x	
Turbo fluctuosus			r			●									-		
Cerithium stercusmuscarum		x	c	x	x	-				x	x	x	- ●		?	?	?
Solenosteira pallida		x	x	x	x	-				x	x	x			?	?	?
Chione undatella		-	r	x	x	Cx				-	-		-		-		

ⓐ-island too small
ⓑ-no rock
1)-everywhere except
S. Est.
c-common
Cx-most common
r-rare
ⓒ-only on east shore
ⓓ-turbulent water
ⓔ-too rocky

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MOLLUSCS II

	Punta Peñasco	Porto Libertad	Desemboque	Estero de Sargento	Campo Viviero	Porto Kino	Guaymas	Tepopa	Coast of B. C.	Tiburon	Tecomate	Infernillo	Patos Isl.	Raza Isl.	San Esteban	San Lorenzo	Angel de la Guarda
Conus regularis 1)	x	x	x	P	x	-	x	x	x	x	x	x	x	-	● x	x	x
Columbella fuscata																	
Tegula rugosa	?	x	x	x	x	-	● x			x	x ●	x	x		x	?	?
Enefaustia funiculata	?	x	x	x	x	x	?				- ●	x			-	x	?
Trivia radians			x								x	x	x		x	x	?
Neretina luteofasciatum	?	?	x	x	x	?	?			x		-	-	?	?	?	?
Cypraea annettae		x	x	x	x	?	?			x	x		x		? ●		
Tellina rufescens 1)	x	x	c	x	x	x	x	x	x	x	x	x	-	x	-	?	?
Olivella dama		x	P	-	-	-				x	x	-	-		-		
Crepidula squama			x	x	x	x					x	x	x	x	-	x	?
Carditamera affinis			?	c	x	●		?		x	x	x	-	?	-	?	?
Acmaea dalliana		x	x	x	x	-					x	x			P	-	
Isognomon chemnitzianus	x	x	x	x	x	x				x	x	x	x		?	x	?
Volsella capax		x	x	x	x					x	x	x	- ●		x	x	x
Pteria peruviana	?	c	P	x	x	P	?			x	c		- ●		-	?	?
Ficus ventricosum		-	Ce-	-	-	-	?			x	x		-		-		
Nioche histrionica	?	-	x	x	x	x	?				x	-	-		-	-	?

CRUSTACEA

	Punta Peñasco	Porto Libertad	Desemboque	Estero de Sargento	Campo Viviero	Porto Kino	Guaymas	Tepopa	Coast of B. C.	Tiburon	Tecomate	Infernillo	Patos Isl.	Raza Isl.	San Esteban	San Lorenzo	Angel de la Guarda
Cirripedia 1)	x	x	x	x	x	-	x	x	x	x	x ●	x	x	x	x	x	x
Axius vivesi		x	c	x	-	●	?			-	P ●				-		
Leptodius occidentalis		?	x	x	x	●				x ●	x	x	- ●		?	?	?
Speleophorus schmittii	x		x		x	●				x	x				x		x
Microphyrus platysoma		x	x	x	-	●				x	x		x		?		
Petrolisthes armatus		?	x	x	-	-	?			x	x				-		
Callinectes arcuatus	?	x	P	x	-	-	?			x	x	-	x		?	?	?
Glyptoxanthus meandricus		x	P	x	-					x	x	x	-	-	?	?	?
Pilumnus townsendi		x	P	x	-					x	x	x	-	-	?	?	?

1)-everywhere except at Kino
● -in one part of it only
● -too sandy
● -too turbulent
● -less than in Desemboque

MISCELLANEOUS

	Punta Peñasco	Porto Libertad	Desemboque	Estero de Sargento	Campo Viviero	Porto Kino	Guaymas	Tepopa	Coast of B. C.	Tiburon	Tecomate	Infernillo	Patos Isl.	Raza Isl.	San Esteban	San Lorenzo	Angel de la Guarda
Annelid worm 1)	x	x	x	x	x	?	x	x	x	x	x	x	x	x	?	x	x
Eurythoe		x	c	x	x	-	?			x	x		-		?		?
Heliaster		x	Con		x	-	?			x	x		x		?		
Holothuroidea		x	x	x			?			x	x		-		$?^{2}$		
Encope grandis 1)		x	P	x	x	c	x	x	x	x	x_3	x	x	x	-	x	x
Echinometra vanbrutti		x	P	x	x_4	$2^{?}$				x	x						
Anthozoa		x	c	x	-	-				x	x		x				
Medusa																	
Porifera		x	c	x	x	?				x	x		-		x		

1)-Desemboque and everywhere else
2 -too rocky
3 -more than in Desemboque
4 -no rock

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INSECTS I

	Punta Peñasco	Porto Libertad	Desemboque	Estero Sargento	Campo Vivora	Porto Kino	Guaymas	Tepopa	Coast of B. C.	Tiburon	Tecomate	Infernillo	Mts. of Tiburon	Patos Isl.	Rasa Isl.	San Esteban Isl.	San Lorenzo Isl.	Angel de la Guarda	Desemboque (mountains)	Tepopa (mountains)	Buena Vista	San Francisco	Hermosillo	Nogales	Campo Utah
Megacephala carolina			r			c				-						-	?				x		x		
Cicindela cartagena col.		x			x						x	x							-						
Cicindela californica Mob.		x			x						x	x							-						
Cicindela lemniscata																									
Cicindela californica brev.		x			x						x	x							-						
Chlaenius erbus		x	x	x	x	x				x	x	x	x	-		-					x		x		
Calosoma prominens			x	-		x				r						-	?		x		x				
Saprinus discoidalis			r			?				x						-			x			?	?		
Hydrophilus insularis			x			?										-					x		x		
Chalcolepidius smaragdinus		x	r	?	x	?				r	-	x	x	-		-					?	?	?		
Melanotus cribricollis																									
Horistonotus-sp.																									
Meloidae sp.																									
Cymatodera sp. A																									
Cymatodera sp. B																									
Cnemis sp.																									
Polycesta velasco			x			x				x									x		x		?		
Hippomelas			x			x				x						-	?		x		x		?		
Dermestes maculatus			x			x				x						-	?		x		x		?		

r -rare
c -common
1)-only in arroyo and near water
2)-not even at will
* -distribution not indicated
3)-ranchero and arroyo
4)-in interior near tenajas
5)-only when rains in arroyo

INSECTS II

	Punta Peñasco	Porto Libertad	Desemboque	Estero Sargento	Campo Vivora	Porto Kino	Guaymas	Tepopa	Coast of B. C.	Tiburon	Tecomate	Infernillo	Mts. of Tiburon	Patos Isl.	Rasa Isl.	San Esteban Isl.	San Lorenzo Isl.	Angel de la Guarda	Desemboque (mountains)	Tepopa (mountains)	Buena Vista	San Francisco	Hermosillo	Nogales	Campo Utah
Eleodes		x	x	x	x	x				x	x	x	x	-		-					x		x		
Asidina confluens			x													-	-								
Cryptoglossa verrucosa			x													-	-								
Steriphanus punctatus			x			x				x									x		x		?		
Edrotes ventricosus			x			x				x						-	?				x		-		
Glyptotus sp.		?	x	*	x	x		x		x	x	x		-		-	?	?	x	x	x	x	x		
Trox suberosus			c		-	x				x						-			x		x				
Diplotaxis knausei		x	x	x	x	x				x	x	x	x	-		-					x		x		
Cyclocephala longula			c	x		x										x			-		?		-		
Cotalpa consobrina			x			?				-	-					-					x		x		
Scarabaeidae sp.																									
Anoplognathus dunnianus			r	-	x	x				?	?	x	?	-		?					?		?		
Ligyrus gibbosus			c	x		x										x			-		?		-		
Strategus			x			?					-					-					x		x		
Moneilema			x	-	x	x		x		x	x	x		-		-	?	?	x	x	x	x	x		
Aneflus prolixus			r	x	x	x	x			?	?	?	x	-	-		?				?				
Aneplus sp.																									
Derobrachus geminatus		x	r	?	x	x	?			x	x	x	?			-	?	?	x		x	?	x		?
Achryson surinamum																									

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INSECTS III

	Punta Peñasco	Porto Libertad	Desemboque	Estero Sargento	Campo Vivora	Porto Kino	Guaymas	Tepopa	Coast of B. C.	Tiburon	Tecomate	Infernillo	Mts. of Tiburon	Patos Isl.	Mass Isl.	San Esteban Isl.	San Lorenzo Isl.	Angel de la Guarda	Desemboque (mountains)	Tepopa (mountains)	Buena Vista	San Francisco	Hermosillo	Nogales	Campo Utah
Acanthoderum penninsularis																									
Apatides fortis x		x	c	x	x					x	x	x	x	x		-?	?		x		x	?	x		
Empagenoderum x			x	?		x				x						-			x-		?		?		
Acheta similis	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Eremopeeles bilineatum	?	?	x	-	x					x			x	-	-	-			x						
Insara covillae	?	?	x	-	x					x			x	-	-	-			x						
Clematodes larvae		?	x	-	-	x													-						
Periplaneta americana			r	-		x				x				-		-	?				-		x		
Arenivaga sp.			r	-		-				-	-	-	-	-		-	?	?	-				?		
Anconia integra	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	-	?	x	x	x	x	x	x	x	x
Diapheromer calcarata			r	-		-				x											x		x		
Stagmomantis limbata			r	-		-				x															
Stagmomantis californica			r	-		x				x															
Mantidae sp.			r	-		x				x						-			x			x	r		
Rhytidolomia sayi																									
Lethocerus delpontei			r	x		-				-						-					x		x		
Rasahus thoracicus			-	-		r				x						-			x		-		x		
Tristoma rubida			r	-		x				x						-			x		?		?		
Leptoremma sp.																									
Reduviidae sp.																									

INSECTS IV

	Punta Peñasco	Porto Libertad	Desemboque	Estero Sargento	Campo Vivora	Porto Kino	Guaymas	Tepopa	Coast of B. C.	Tiburon	Tecomate	Infernillo	Mts. of Tiburon	Patos Isl.	Mass Isl.	San Esteban Isl.	San Lorenzo Isl.	Angel de la Guarda	Desemboque (mountains)	Tepopa (mountains)	Buena Vista.	San Francisco	Hermosillo	Nogales	Campo Utah
Hemalocaris minutum																									
Diceroprocta sp.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	-	-	x	x	x	x	x	x	x	x
Acanalonia		?	r	x	x	x				x	x	x	x	-		?					?	?	?		
Scolopsella reticulata																									
Erax argyrosoma		x	r	-		x				x	x	x	x	-		?					x	[illegible]	?		
{Hermetia sp.			r							?				-		-									
(Stratiomyidae larva)																									
House-fly (blow)																									
Paranthaclisis hageni			r	x		x				x						x					[illegible]		x		
Scotoleon congener			r	x		x				x						x							x		
Chlorion aerarium			r	x		r				x						-					?		c		
Hemisia sp.			r	-		?				?						-	?	?			?		?		
Bee	x	x	x	-	x	x	x	x	x	x	x	x	x	-	x	-	x	x	x	x	x	x	x	x	x
Ptiloglossa mexicana		x	r	x	x	x				-	-	x	-	-							?		?		
Dasymutilla klugi			x			?				x						-	-		x				?		
Dasymutilla magna		x	x	-	x	-				x	x	-		x		-			x						
Photoppia																									
Pepsis			r			?				c						x							x		
Ascia sevata *																									

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9: Malkin E-5 (1953-1955) 1962 NU31 Seri NU31

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	Punta Peñasco	Porto Libertad	Desemboque	Hatero Sargento	Campo Viboro	Porto Kino	Guaymas	Tepopa	Coast of B. C.	Tiburon	Tecomate	Infiernillo	Mts. of Tiburon	Patos Isl.	Raza Isl.	San Esteban Isl.	San Lorenzo Isl.	Angel de la Guarda	Desemboque (mountains)	Tepopa (mountains)	Bahia Vista	San Francisco	Hermosillo	Nogales	Campo Utah
Danaus gilippus strigosus			e			x				x						x	?	?	x		x				
Agraulis vanillae			e	-		x				x						x	?	?	x		x				
Amblyscirtes			e	x		?				r						r					x		?		
Phlegethontius sexta			x										-			x	?		r				?		
Sphingidae			x							-															
Erebus odora			r			-				x						x			x				x-		
Artema atlanta			x													-	-								
Sympira celestina	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	?	x	x	x	x	x	x	x	x
[illegible] bivittatus			x			x				x						x							x		
Latrodectus mactans	x	x	x	x	x	x	x	x	x	x	x	x	-	x	x	?	x	x	-x	x	x	x	x	x	x
Aphonopelma			x							e						x			x				x		
Hadrurus hirsutus	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	-	?	x	x	x	x	x	x	x	x
[illegible] calexicensis	x					x				x						?	?				x				
Scolopendra malkini		-	r	-	x	x				-				-		-			s						
Orthorus sp.			x							-									x				x		
Acarina			x							-											x		x		
Ixodidae			x							-															

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9: Malkin Seri NU31

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/For detailed information on Seri beliefs about native animals, see category 116, pp. 10B-16B, 17B-46B, 47B-57B, 61-68.